WOOD WORKING Digest

JULY 1954

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WOOD WORKING DIGEST

222 E. Willow Ave. Wheaton, Ill.

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A HITCHCOCK PUBLICATION

Another
REASON WHY BERTHELSEN PRESSES ARE BETTER . . .

THE BERTHELSEN "CHAMBERED" PLATEN

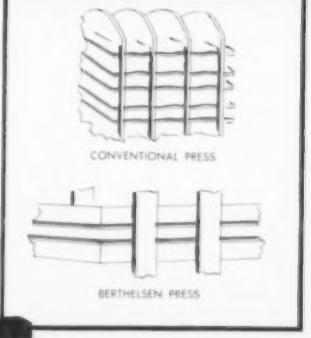
The "**Chambered**" construction of the Berthelsen **platen** can be seen in the schematic illustration above. Red arrows indicate the unrestricted flow of steam even at low pressures. The generous capacity of this platen design serves as a heat reservoir which does not diminish in temperature when in contact with the press load. Because of the large surface contact between the steam and the heating surface of the platen (compared to other types of platen construction) heat is evenly transmitted to the work (Fig. 1). No other platen design can offer more **uniform temperature** over the entire pressing area in any temperature range.

Note the all steel welded construction of the platen. Designed as a structural member of the **Berthelsen Press**, it provides **operational rigidity** and remains in parallel with its opposite at ALL points even with use of compressible materials and at maximum working pressures. (Fig. 2).

The "Chambered" platen is only one of many **Berthelsen Hot Press** features that insure **control** of the variable factors affecting **quality** and rate of **production** in pressing operations. Investigate how a Berthelsen Press and modern production techniques can best serve you.

FIG. 1 HEAT TRANSMISSION COMPARISON

FIG. 2 STRUCTURAL RIGIDITY COMPARISON



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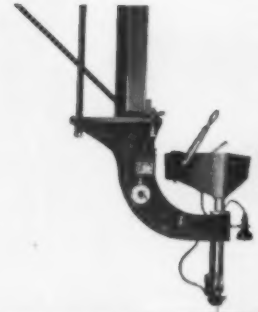
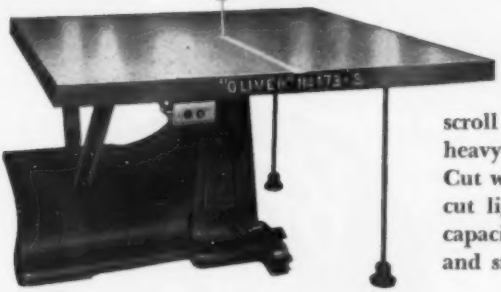


Choose the "Oliver" Jig Saw that meets your needs BEST!



Interior and exterior scroll work are easily cut on heavy duty "Oliver" Jig Saws. Cut wood at high speed. Also cut light metals. Unlimited capacity. Unmatched for easy and smooth operation.

"OLIVER" No. 173-S JIG SAW

Upper tension unit of this machine (above) is mounted on ceiling to give unlimited capacity. Has table 72" or 34" square. Saw is operated by vari-speed drive at 650 to 1300 strokes a minute. Motor and brake completely controlled by a foot-lever.

"OLIVER" No. 173-E JIG SAW

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WOOD WORKING Digest

JULY, 1954
Vol. 56, No. 7

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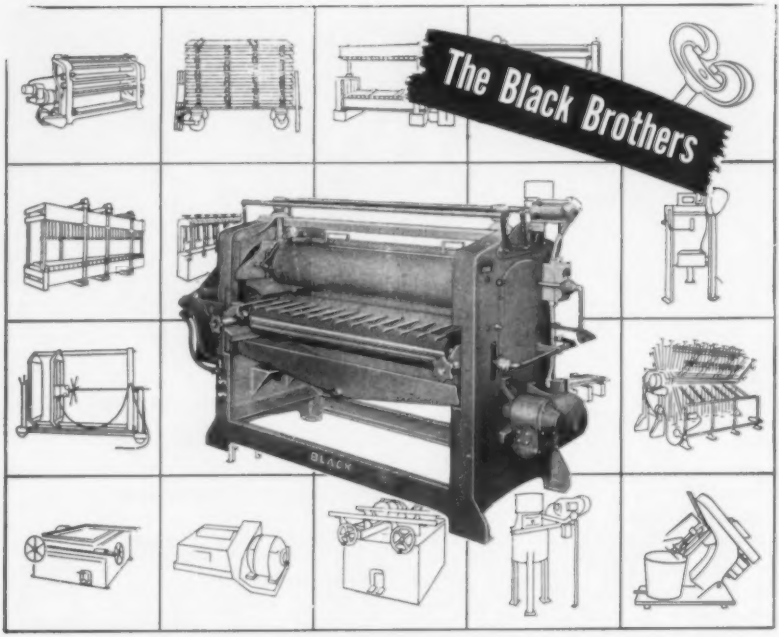

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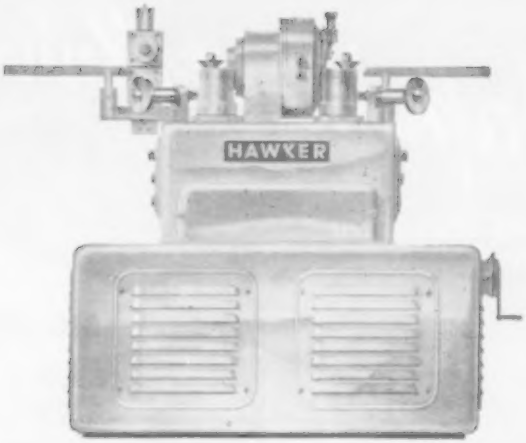

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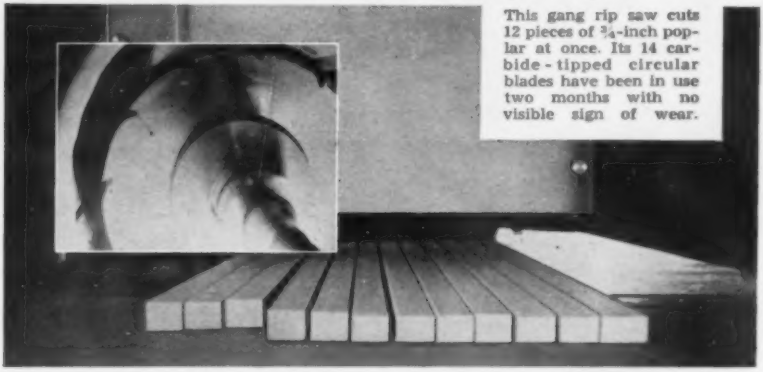

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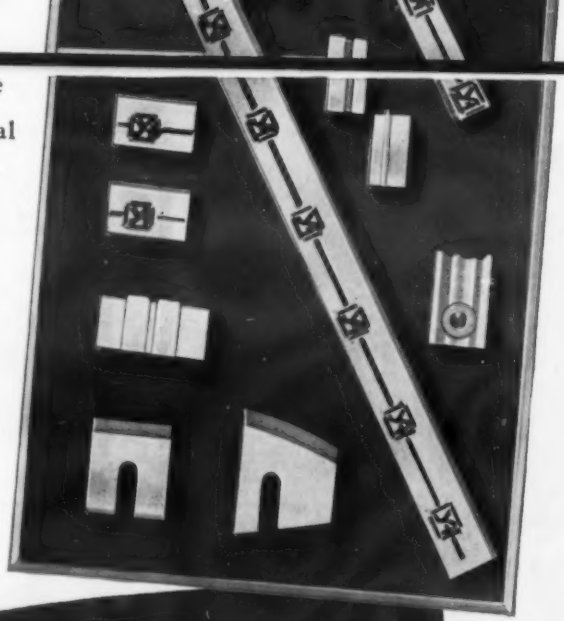

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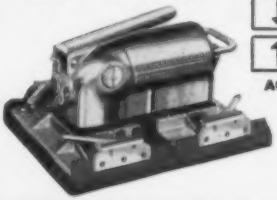

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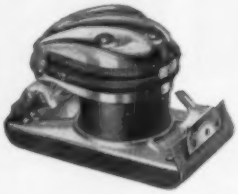

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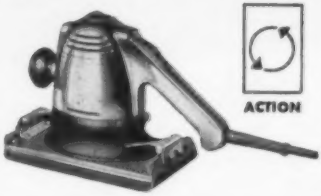

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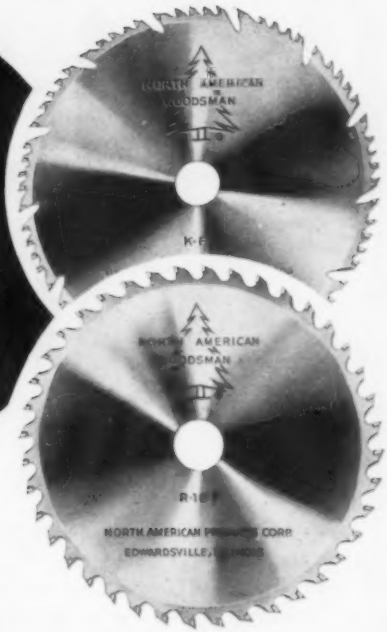

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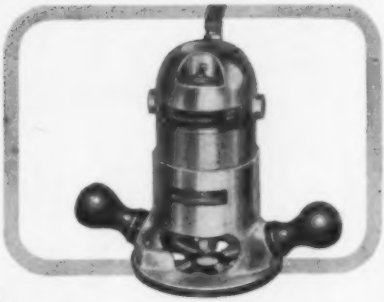

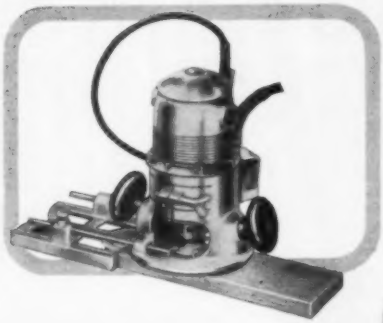

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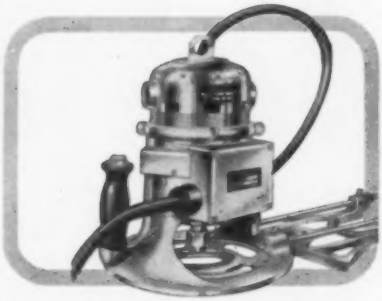

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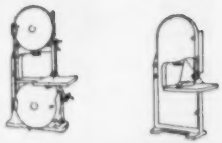

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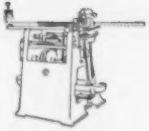
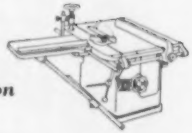
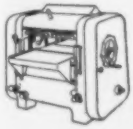
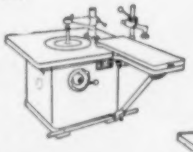
- Borers—Mortisers
- Miterers—Trimmers Rod Machines

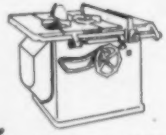


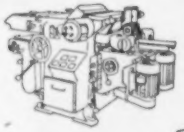


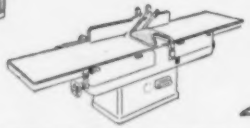
A Fay & Egan sales engineer will be pleased to study your requirements and give you specific information regarding the F. & E. Tool Lease Program. Write, wire or phone, Fay & Egan 2023 Eastern Avenue, Cincinnati 2, Ohio, Phone PLAZA 0730.

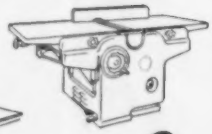












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Ask about our deferred payment plan, also.

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FILL OUT AND MAIL TODAY!

Leitelt Equipment can save many hard dollars in your plant and yard through more efficient lumber handling. For instance, the Leitelt Power Transfer Car operated by one man moves kiln car loads up to 30 tons with ease and safety. One man does a job that ordinarily takes the time and labor of five to eight men. Look around your plant or yard and see how many men are involved in handling lumber. If you are using more than one man or a Transfer Car it's time to call on Leitelt.

SAVE Lumber Handling Dollars with LEITELT

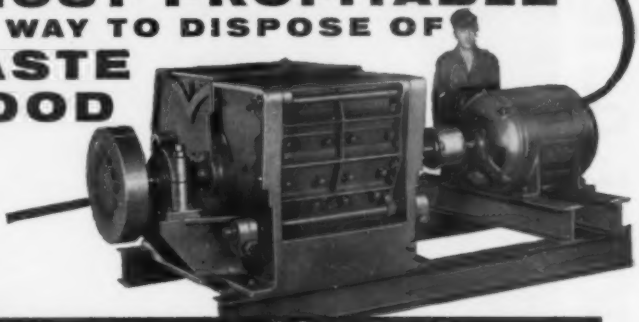
Write for full information on Leitelt Lumber Handling Equipment. We will be glad to advise the correct installation for your particular lumber handling requirements. Every installation pays for itself.

Manufacturers of Lumber Lifts Car Pullers Power Driven Turntables Subcars and Leitelt Swing Tables

LEITELT IRON WORKS
400 Mill St., Grand Rapids 2, Mich.

Notice in the installation below how one man handles a kiln load of lumber. The power Transfer Car does the actual work, whether it's pushing or pulling a load into or out of dry kilns or storage tracks.

MOST PROFITABLE WAY TO DISPOSE OF WASTE WOOD



WILLIAMS "No-Nife" HOGS

MAKE UNIFORM CHIPS FOR CHIP BOARD. Williams Hogs operated in closed circuit with Williams Vibrating Screens reduce wood offal to exactly the proper size chips for chip board, wall board or other profitable by-products.

CONVERT WOOD REFUSE INTO VALUABLE FUEL. Refuse, not otherwise usable is cheaply hogged for more complete combustion. Unhogged wood restricts air flow, smothers the fire, burns unevenly, creates excessive smoke. Williams equipment also reduces handling costs as much as 75%. When hogged, one man can handle as much as three men can handle in long, cumbersome pieces.

WILLIAMS CAN SUPPLY COMPLETE EQUIPMENT for the conversion of wood offal into wood flour, insulation or any of the new and more profitable uses of wood.

Write for Illustrated Brochure

WILLIAMS BUILDS A COMPLETE LINE

• Hogging, Grinding and Shredding Machines
• Vibrating Screens • Air Separators • Conveying Systems
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CRUSHERS GRINDERS SHREDDERS

OLDEST AND LARGEST MANUFACTURER OF HAMMER MILLS IN THE WORLD

SPEEDS QUALITY PLASTIC DINETTE OUTPUT

High-speed cold press plastic lamination at
PRODUCT DESIGN & MFG. CORP., East Paterson, N. J.
— largest single Eastern producer of
laminated plastic dinettes.

BEN BUNIN, *President*, in Charge of Production
EZRA GROSSMAN, *Secty. Treas.*, in Charge of Sales

LOWERS UNIT COST with fast-setting, ready-for-use resin

KWIK-KLAMP 3048 produces handling bonds of plastic-to-wood and backing sheet-to-wood in pressing cycles of as little as 15-30 minutes.

READY-FOR-USE with no expense or delay for mixing. Enjoy daylong pot life, good storage stability under varying temperature conditions. Feed into the spreader by hand, air pump, or pour directly from the drum. Glue has no irritating odor and cleans up very readily.

We'll be glad to explain our high-speed, straight-line operation. Obtain hot-press efficiency in labor and space with new high-speed cold-press method.

• • •

RESYN 53R3049 is used by many laminators whose operations are geared to 2-3 hours clamp before cutting. Low cost, moderately fast setting, Resyn 53R3049 makes possible gluing, pressing and machining in the same day.

Glue spreader is applying a very light, uniform film of National KWIK-KLAMP 3048 to both sides of birch plywood cores as fast as the off-bearer can handle them.

Laminating before pressing. Plastic sheet is simply placed on top of glued core by hand after it has been laid on backing sheet of hard-board.

Tables are ready to be cut at end of short conveyor system. Machining strengths are obtained in as low as one hour. Finished goods can be shipped in less than two hours.

RESYNS®
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ADHESIVES

NATIONAL ADHESIVES (Resin Division), Dept. WD, 270 Madison Ave., New York 16 • 3641 So. Washtenaw Ave., Chicago 32 • 735 Battery St., San Francisco 11

☐ Ship 5 gallons of National KWIK-KLAMP 3048. Bill at quantity drum price.

☐ Send Plastic Lamination leaflet.

☐ Have National representative call to explain your KWIK-KLAMP production plan.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State_____

To mention dimension *means*

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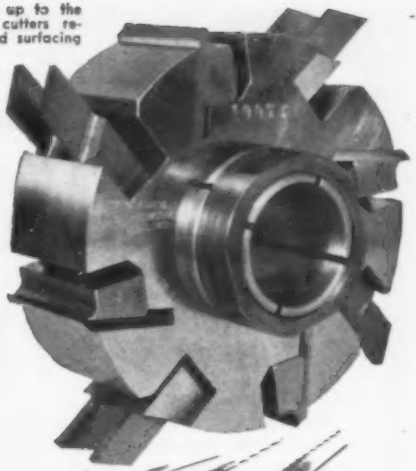
Yours is a terrific order? Let us quote. We're sizable ourselves.

Send for a copy of our new booklet now.

Morgan Manufacturing Co., Inc. BLACK MOUNTAIN, N.C.

The Nation's largest and most diversified producer of **WOOD DIMENSION** for furniture makers and other industries

This Splitter Head is made in any length, up to the width of the machine. With the splitter cutters removed, the round head becomes a standard surfacing head.



No "Splitting" Headaches

Fact is, Diehl Design Engineers solve the trickiest splitting problems—as well as all other cutting problems, too—with their wide knowledge and skill in all phases of wood processing.

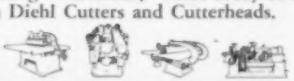
For example, Diehl designed this Splitter Head primarily to surface flat stock and cut it into multiples, such as the three square dimensions shown. However, these Splitter Cutters can be made in various forms to produce V or beaded ceiling; for grooving stock, such as drawer sides; or for rounding the corners on casing or like patterns. And, the head shown above can be adapted to efficiently handle these last three operations on small quantity runs. For large quantity, high speed work, special Diehl designed heads, of course, are required. To eliminate your splitting "headaches," write today for full details on Diehl Cutters and Cutterheads.

CUTTER DIVISION

On the Banks of the Wabash

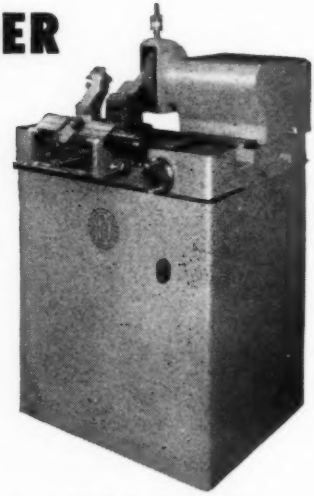
THE G. M. Diehl MACHINE WORKS, INC.

WABASH, INDIANA • U. S. A.



Don't be a slave to high tool grinding costs...

Switch to the REDCO TOOL GRINDER *and Save up to 35%!*



Here's the Redco Tool Grinder equipped with the profile knife grinding attachment.

Accuracy, versatility and simplicity—they're the three key words that best describe the Redco Tool Grinder... the grinder that produces cost savings up to 35%.

It's accurate . . . capable of grinding within .001" tolerances.

It's versatile . . . equipped with the proper attachment it resharpens carbide tipped cutter heads, router bits, saws, grooving cutters, and other woodworking tools—makes and resharpens high speed steel and carbide tipped profile knives.

It's simple to operate...reference keys and index plate assure correct cutting angles and precision finishes. After a brief training course—given free at Redco—any normally skilled operator can keep your production tools in tip-top condition.

Don't be a slave to high tool grinding costs—*switch to the Redco Tool Grinder and save up to 35%!* Write today for all the facts.

REDCO

TOOL DIVISION
RED LION CABINET CO.
RED LION 3, PA.

Black & Decker SCREW DRIVERS *are powered for* faster work, greater accuracy, more dependability!

New No. 8 SCRUGUN*
High-powered, light, compact . . . drives up to No. 8 screws to uniform tightness automatically. Quality built for high production service. Choice of paddle or toggle switch.

Choose from 21 models of Black & Decker Screw Drivers . . . for driving and tightening everything from the smallest screws to ½" diameter nuts. They're all powered by B&D-built universal motors for fast, steady driving. They're light and well-balanced—cut operator fatigue, reduce slippage and marring. Choice of positive or adjustable clutch, 90° angle heads for close quarter work. For dependable performance on all jobs, specify Black & Decker!

See your nearby B&D distributor for demonstrations of these and other time-saving, cost-cutting tools. For free catalog, write: THE BLACK & DECKER MFG. CO., 635 Pennsylvania Ave., Towson 4, Md.

*Trade Mark Reg. U. S. Pat. Off.

DRILLS
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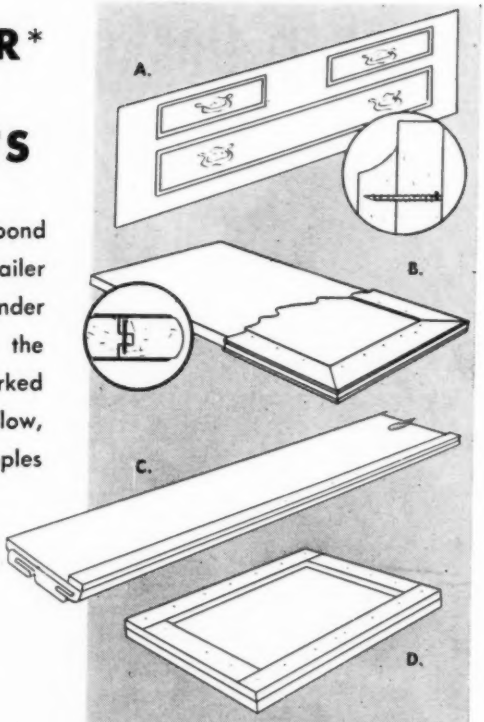
BENCH GRINDERS
SAWS
GLUE POTS

LEADING DISTRIBUTORS EVERYWHERE SELL

B&D Black & Decker PORTABLE ELECTRIC TOOLS

AUTO-NAILER*
IDEAL FOR
GLUE JOINTS

A tight joint and positive glue bond are assured by using Auto-Nailer because the work is squeezed under 1000 pounds pressure. And the stock can be handled and worked while the glue is setting. No slow, costly clamping. A few examples are illustrated here:



A. Glue-nail false drawer fronts to panels, invisibly.

B. Glue-nail rims to cores.

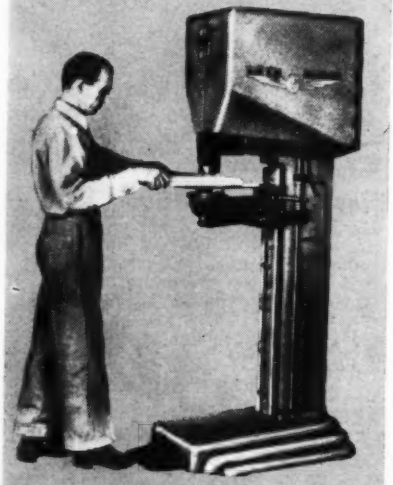
C. Glue-nail bed-rail slat-bearers.

D. Invisibly glue-nail bands.

We will gladly send you the illustrated book which shows many more practical uses, now being employed by leading furniture plants and others. You will see dozens of ways this versatile machine can save money in your plant.

AUTO NAILER

*Trademark registered U.S. Patent Office



AUTO-NAILER COMPANY • 269 Marietta St., N.W., Atlanta 3, Ga.

WE ARE FORTUNATE.... *BUT!*

Do you realize that ours is one of the few industries not suffering from some form of recession? In fact, we are carrying with our present prosperity, many fringe industries. This situation makes wood an even greater target for metal, plastics and other synthetic products than ever before.

When we look around us industrially, we see many manufacturer fatalities in fields making basic products; basic in their particular classification, so they thought. Little did they realize that their products would some day be replaced by substitutes.

A glaring example of the fallacy of such thinking is the textile industry, such as makers of non-advertised linens, cotton goods, men's suitings, and other similar fabrics. These are rapidly being replaced by widely advertised, cleverly promoted, synthetic materials, such as fiberglas, dacron and nylon, to mention a few.

All of which should give us in the woodworking industry reason to pause and consider our own situation. Are we individually, and as an industry, doing all we can to promote the use of wood and wood products? As indicated by the number of entries in the WOOD WORKING DIGEST "Award of Merit" contest, there are many companies and organizations carrying on worthwhile campaigns to promote the use of wood and wood products, but industry-wide they are comparatively few.

We must realize that we are, and will continue to be, faced with the keenest competition, because of our position in the industrial picture. To meet this competition, we must keep our plants and equipment in the best possible condition. If you intend to get a greater share of the business than you have been, plant rehabilitation may be needed, and this should be correlated with well integrated advertising, promotion and sales efforts.

If you are planning to cut costs, about the only way open to you is modernizing your equipment and improvement in your production procedures. A careful study of these elements could show you the way to reduce expensive labor costs and improve quality of product. Many progressive companies are now entering a long range financial plan which will contribute to the stability of their capital expenditures. This method is about the only one that will keep costs from rising.

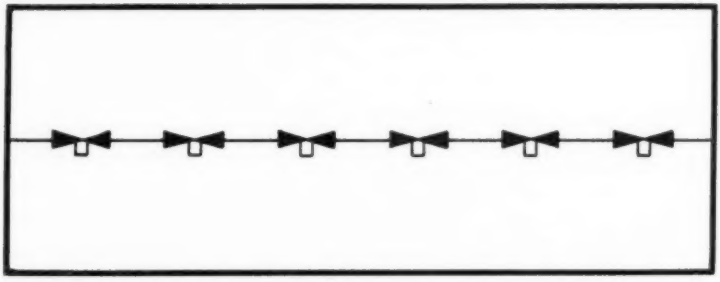
Certainly the only way we can hope to reduce over-all labor costs is to reduce the number of employees or make their efforts more productive. The right machinery, equipment, materials and procedures can do all this for you.

YES, WE ARE FORTUNATE, BUT WE MUST CAPITALIZE ON OUR OPPORTUNITIES!

Ned Bailey
Editor-in-Chief

Yes, an old-time patent has expired!

In 1934, a patent was granted to Forrest Cobb of Moore Dry Kiln Co., covering a dry kiln, like this:



Only a few of these kilns were built, for a very good reason:

A later MOORE development—the Longitudinal Shaft Moore Reversible Cross-Circulation Kiln —proved superior and offered undeniably greater advantages:

(1) Faster and more uniform circulation through each sticker course *(It's the air across the lumber that does the drying).*

(2) Lower power consumption for equal volume of circulation.

(3) One motor and drive located outside kiln operates entire fan system *(Motors and wiring should not be subjected to inside kiln conditions).*

The Moore Cross-Circulation System has been universally adopted by the industry—proven by over 7,000 Kilns in daily operation.

Your old-type kilns can be converted to this modern drying system—contact our nearest office.

MOORE DRY KILN COMPANY

Oldest and Largest Manufacturers of Dry Kilns and Veneer Dryers

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Comments from THE NATION'S CAPITAL

By Arnold Kruckman
Washington Correspondent

Joel B. Ware of Flossmoor, Illinois, was appointed Deputy Director of the Forest Products Division, Business and Defense Services Administration, U. S. Department of Commerce. The appointment was announced by BDSA Administrator Charles F. Honeywell. Mr. Ware succeeds the late Merrill Lord, who died recently.

It is particularly interesting to note that there are few men from business in some of the divisions of BDSA. BDSA, of course, is the abbreviated successor of NPA. When NPA was going strong it had between 5,000 and 6,500 employees. Its successor, BDSA, is crowded when it has 400 persons total. The shrinkage was accomplished by consolidating many divisions and sections in other parts of the agency. For instance, Forest Products Division which has been variously known as Lumber and Wood Products Division, and has also been part of the General Industrial Equipment Division and the Building Materials and Construction Division and still other divisions, at one time consisted of lumber, wood products, pulp, paper, printing and publishing. In those days it had over 200 persons in its personnel. Today the Forest Products Divisions has 15 on its rolls.

You can reach those in charge of the wood products affairs by calling Sterling 3-9200, extension 3365. You will probably get more information by asking for Tom Mason or James M. Owens. Mr. Owens is the Assistant Director for Lumber and Wood Products of the Division.

Most BDSA Divisions have the benefit of the help of "wocs." The "wocs" are men who have been loaned to the agency by industry. The letters - w o c - mean without compensation. These men remain on the payrolls of the firms which lend them to the government and they come with the understanding that their term

of service will be limited to six months. Men like Mr. Ware are "wocs".

It is difficult for the various divisions to obtain the services of "wocs." Men connected with industry are extremely reluctant to quit the work in which they are engaged. It should easily be understood that quitting their jobs, which are usually key jobs, may spell trouble and worry and all kinds of problems in their own businesses.

The federal government has tried very earnestly to persuade businessmen of unusual stature to come into the service of BDSA, as well as other agencies, for the prescribed six months. They want them to come with the same spirit that a young man goes into the Army, or the Navy or the Air Force. The argument is that the man from business can help to train the regular career people in government in certain general broad practices of business and in specific aspects of particular businesses. At the same time, the man from business can get a very sound training in the business of government from these people in the civilian phase of government activity. People in business and industry are just discovering that the whole technique of government business is very much different from the technique of the normal private industrial business.

There are a considerable number of men in government at the present time doing their stint as volunteers, both as a training force and as trainees. But the number is very small compared with the number that the federal government thinks is necessary to make ready for all possible eventualities. The problem is trying, both for industry and for government.

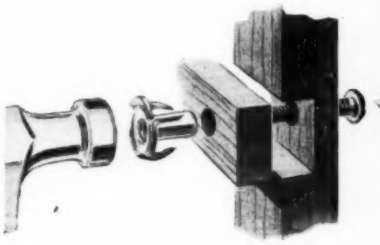
Of course, all parts of the government have some sort of blueprints ready for any eventuality that may occur. But they go to great trouble to impress upon one that these blueprints are purely temporary. They say that when the real need comes they will prepare the permanent blueprints. All parts of the BDSA are trying earnestly to impress industry with the need to plan to take steps to protect industrial assets so that these assets may be ready and in good condition if and when a war comes. They all make much of the fact that when the next emergency occurs the controlled materials plans will call for different ideas, different methods and different proceedings, unlike those with which we were familiar even during the recent Korean War. The techniques of war change swiftly, even in their application to civilian processes as well as to actual combat.

When NPA was at its normal there was always a place where one could get help. Today useful services may be had by communicating with W. A. Vanstory, Director of the Communications Division of BDSA. His offices are in the Commerce Building, Rooms 4029B to 4035. His telephone is Sterling 3-9200, extension 4821. His Deputy is Al W. Falk, whom you reach on the same telephone on extension 4822.

Businessmen of all industries should emphatically bear in mind that most official Washington, under cover, believes it is probable that we shall get into the Indo-Chinese War. Our information here is not based on the varied stories that come out

New, Improved TEENUT®

FOR FURNITURE and GENERAL WOODWORKING

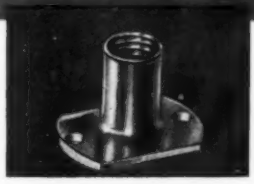


New, barbless prongs are curved, for twisting action as TEENUT is driven, provide increased holding power in wood.

STEEL THREADS IN WOOD

TEENUTS provide positive anchorage for bolts and can be used with or without counter-boring. Ideal for knock-down furniture or wherever fasteners must be concealed, TEENUTS make possible repeated assembly and disassembly without damage to wood. Simply drill hole size of TEENUT barrel and hammer in the TEENUT. Same size hole for bolt. Wide variety of thread sizes, barrel lengths, flange designs... can be supplied in volume quantities.

NAIL-ON TEENUT — held by brads instead of prongs. Narrow rectangular base permits use where space is limited.



CAPPED TEENUT — for exterior use where strength and appearance are important. Cap can be supplied in any standard finish.

OCTOPUS — Teenut and sleeve combination for blind fastening of k-d furniture parts.

UNITED-CARR FASTENER CORP.

31 Ames Street
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MAKERS OF DOT *FASTENERS*

of Geneva; nor is it "skuttlebut" locally so prevalent in Washington. However, it is unofficial and unconfirmed, but comes through official sources. In other words, responsible officials at both ends of Pennsylvania Avenue seriously believe we will get into war in Southeast Asia.

They are talking about stand-by controls, and they think the President should have a free hand to act in Southern Asia, within two days, if necessary. The stand-by controls would freeze wages, prices, rents, (all at the discretion of the President); and the controls would not be selective but would blanket the whole economic field and the related social structure

There are several curious aspects about this business of the war in Indo-China. For instance, the Associated Press recently cabled that 25,000 German youths were killed in Indo-China who had been drafted in French-occupied Germany. Another is the apparent authentic statement that 80% of all the armed manpower used by the French in Indo-China are non-French Europeans. And we are told the French make clear that commercial products, which the French can supply, should be given preference in Indo-China.

Without prejudice or particularly unkind feeling, it is wise to bear in mind that you are not getting the unvarnished facts in the news over the cables and the radio from Europe. If you would get a real grasp of the situation in Europe and Asia, particularly in relation to the Soviet Union, read Louis Bromfield's "A New Pattern for a Tired World." It is, of course, not fiction. This correspondent, who knows Europe, Asia and Africa at first hand, thinks this book of Bromfield's is the most sincere and the most revealing tactfully truthful picture of the situation anyone has recently written. Businessmen, particularly should read it.

Trade agreements again have been to the fore. They have been renewed for another year. There are upwards of 70 applications in the U. S. Tariff Commission from American industrial units requesting hearings in order that the import duties might be raised. These industries wish to take advantage of the section in the agreements known as the escape clause. These industries are chiefly moderate-size business manufacturing units. Some of them have had a continuous history in this country of 125 or more years. The ceramic industry in Ohio is one of them. They find themselves in a tight situation. The Europeans and the Asiatics are shipping their products into this country and selling them at a price, including the cost of the freight, the handling and the duties, and are able to undersell our people to a great extent. The European competition comes from many different sources. The only competition from Asia comes from Japan. As you know, the woodworking industries are hit variously.

It is illuminating to learn that we also are shipping funds abroad to enable the people in Asia and Europe to buy the raw materials which they use in building their competition with us. For instance, just a few weeks ago the Foreign Operations Administration sent $125,000 to Formosa to enable

Look what's happened to Hardboard

Weyerhaeuser Industrial Hardboards have a smooth, smooth surface

WHEN FINISH is important to the sale of your product, look to Weyerhaeuser Industrial Hardboards!

Made by unique dry process methods, these "air-felted" hardboards have been carefully engineered to give you that smooth, smooth surface and uniform density so necessary for good adhesion and uniform coverage. They can be finished with wiping stains, paints, lacquers, enamels, synthetics. Finishes can be air-dried, force-dried or baked. Boards take paint evenly . . . hold their finish better and longer because the uniformly smooth surfaces never check, craze, chip.

Veneers and plastic laminates, too, can be permanently bonded to the remarkably hard, dense surfaces without delaminating or checking. Write for full information now.

- Easily machined. Can be sawed, cut, drilled, shaped, die-cut, routed with clean, sharp edges.
- Excellent gluing, laminating characteristics. No delamination nor peeling.
- Splinterproof, sliverproof, smooth, grainless. Has been bent to 1" radius without rupture.
- Available in the following thicknesses: 1/10", 1/8", 3/16", 1/4".

Weyerhaeuser Sales Company

HARDBOARD DEPARTMENT

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Chiang-Kai Chek to buy logs in the Philippines. Even later the same agency sent a greater sum of money to the same source in order that it might buy woodworking machinery consisting of band saws, wrenches, blades, motor brushes, all sorts of electrical equipment, planers, a great number of tools, power machinery, and similar equipment.

About the same time a considerable sum of money was supplied to Israel so that it might buy various woodworking machines;and the Italians were given thousands of dollars to buy walnut lumber, pitch pine timber and $50,000 worth of special paint. The same agency supplied the funds to buy thousands of untreated wooden poles for the Taiwan Power Company in Asia; and more woodworking machinery for various destinations in Asia. To Iran we sent a wood treatment plant the cost of which was not revealed, but which included an electrical plant, a steam plant and other details including the personnel required for operation and exploitation of the unit. All these, and a tremendous shipment of wood poles were made and paid for by Foreign Operation Administration funds in May and June.

Meanwhile, the House Operations Committee has attempted to take steps to further restrict the paint manufacturing operations of the Navy. The Sub-committee, headed by Congresswoman Cecil M. Harden, recommended that all paint making by the Navy be abandoned as quickly as possible except the plastics, ship bottom and anti-fouling paints which are covered by patents. She thinks these should be discontinued as rapidly as is consistent.

The report pointed out that since 1933 the Navy has been actively and very heavily engaged in making 150 types of paint. A year ago a directive from the Secretary of the Navy presumably cut back production to 28 types. In the year 1953 Navy paint production totaled 6 million gallons, and thus far in 1954 the Navy has produced 3 million gallons. Mrs. Harden's Committee naturally was interested to know where there had been a cut-back in the production.

Hitherto the Navy has produced 200 million gallons of paint each year for commercial disposal. During World War II this production was doubled. The committee report pointed out that only the Navy considered it necessary to manufacture paint, although the Army, Air Force, Coast Guard and Maritime Administrations, and other Agencies, use large quantities.

The Housing bill is designed to encourage the building of homes by individuals, and to attain these objectives: 1) a high volume of residential construction with the assistance of mortgage insurance; 2) providing a more even flow of home mortgage credit to all areas and assuring flexibility in home mortgage terms to keep pace with general economic conditions; 3) placing much greater emphasis on improving and conserving the existing supply of houses; 4) providing mortgage insurance to assist in bringing new privately built housing within the financial groups of a larger segment of our increasing population; and 5) substituting private sources of funds for government expenditures wherever possible, especially in connection with the provision of a secondary market.

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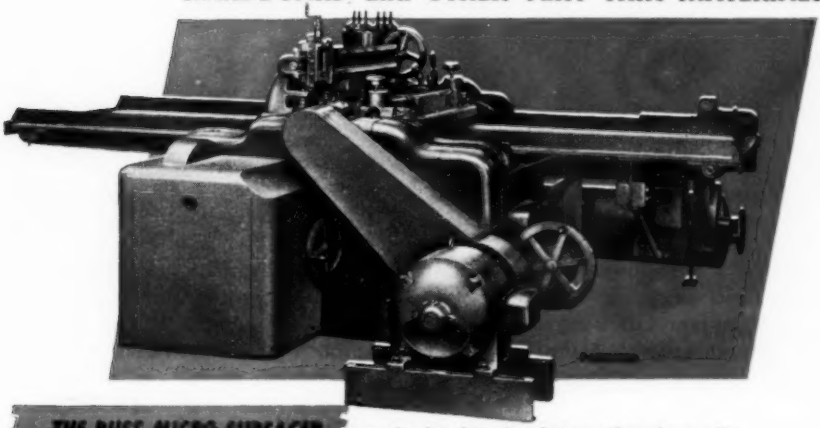

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The Chicago Market got off to a good start on June 21. It was too early, when we went to press, to judge just how this market will go. The consensus was that it would be nothing sensational, but that buying will be steady. Store inventories are still fairly good, but retailers know that they must be ready for the anticipated fall upturn in business.

Much of the northwest lumber industry is crippled by a strike in the lumber, logging and plywood operations of western Washington and Oregon as we go to press. Officials of the three striking A.F.L. lumber district councils in California estimated that slightly more than 14,000 members were out on strike.

October 5-7, have been set for the National Hardwood Lumber Association's 57th annual convention, to be held in Houston, Texas.

Three small sawmill training conferences will be offered by the State University of New York College of Forestry. The dates and places are: August 23, 24. at the Potter Lumber Co., Allegany, N.Y.; August 26, 27, at the John Sirianni lumber Co., Greene, N.Y.; and August 30, 31 at the Lake and Riddell Lumber Co., Piercefield, N. Y. Each conference aims to present the latest information on successful circular sawmill operation.

Additional good news comes from the Hardwood Dimension Manufacturers Association. This group, in cooperation with the School of Forestry at North Carolina State College, Raleigh, N.C., has established a four-year college course in the manufacture of hardwood dimension lumber. The course will begin next fall.

New grade specifications for hardwood dunnage and vehicle stock are being developed for the Corps of Engineers at the research laboratory of

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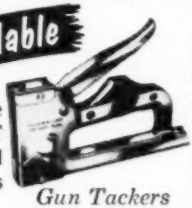

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the Timber Engineering Co., Washington, D. C. Reason is to expedite military lumber procurement. Another advantage in the military's proposals is that their adoption will establish an official basis for NHLA 1 inspection and certification of the military lumber items affected.

A significant development displayed at the Woodworkers' Industry Show, and which we shall describe in a later issue of WOOD WORKING DIGEST was the use of impreg in the manufacture of wood die models and patterns. Nickey Bros., Memphis, Tenn., was the company which provided the impreg boards.

Next month begins a new feature in WOOD WORKING DIGEST. We are calling it "Around the Shop." Purpose of the column will be to acquaint our readers with improved techniques and short-cuts which have been worked out and are in use. Send us your ideas and we'll pay for any we publish at regular contributor rates.

National Starch Products Inc., is again making a real contribution to the industry. This firm is setting up an aid-to-education program. National is conscious of the shortage of technical graduates. Scholarships are being provided at Columbia University, Case Institute, University of Nebraska, North Carolina State College, Syracuse University and Rutger University.

The National Wooden Box Association, Pacific division, plans to hold its summer meeting July 11-14, at Sun Valley, Idaho. Midwest Section of the Forest Products Research Society has a meeting at Madison scheduled for the latter part of July, date undecided.

Stocks of hardwood plywood produced for sale were 2 million square feet ahead of last year at the end of the first quarter.

Results of the "Chicago Market Daily" questionnaire show that most dealers expect business for 1954 to be only 2% under last year's high. Trade-ins would increase business said some 70% of those questioned. The idea would be to turn in old furniture much as the automobile owner turns in his car when buying a new one.

Bureau of Public Roads has announced that it would develop a set of approved wooden bridge specifications. Evidence indicates that properly treated, wooden posts are the lowest cost highway posts obtainable. Standardization of size would help reduce costs further.

Looking backward, it is safe to say that the Industrial Woodworkers' Show at Grand Rapids in May was the best of its kind to date. Germany will continue to bid for business in the woodworking field as a result of the successful machinery fair at Hanover recently.

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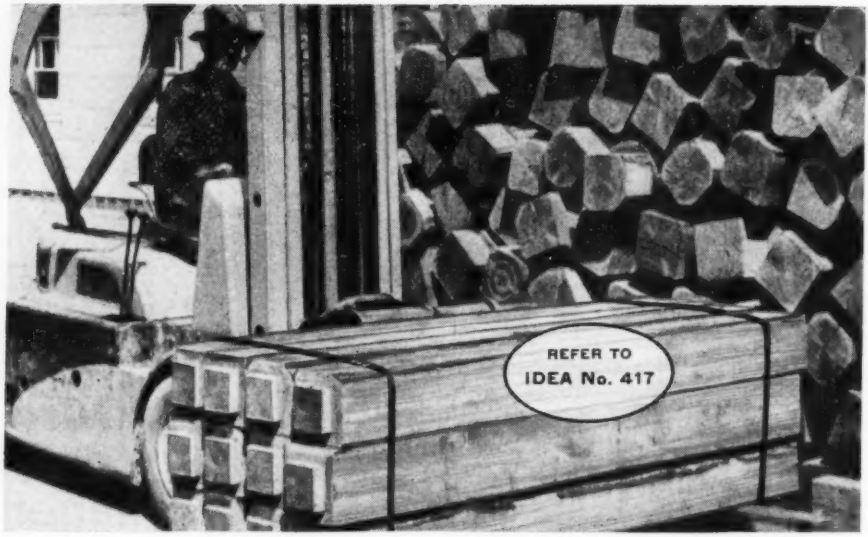

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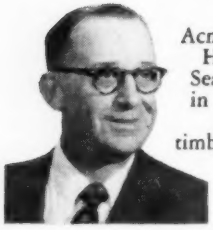

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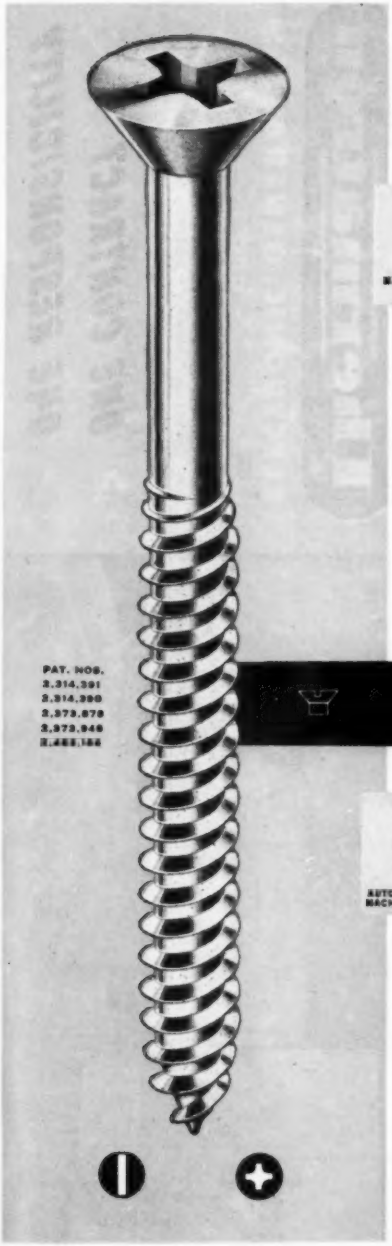

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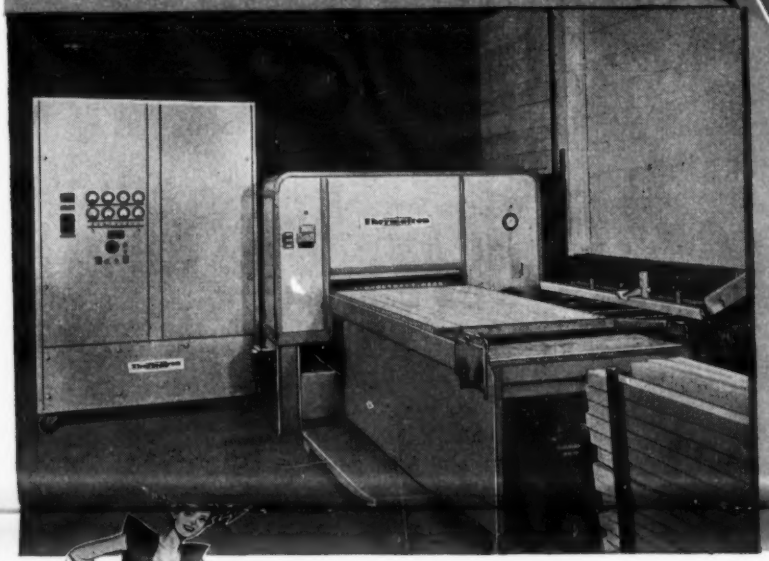

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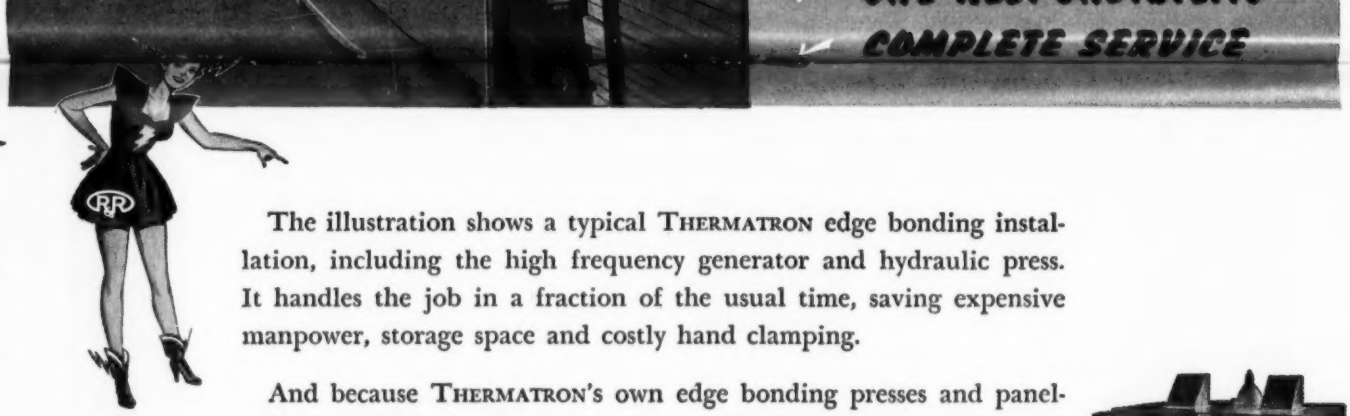

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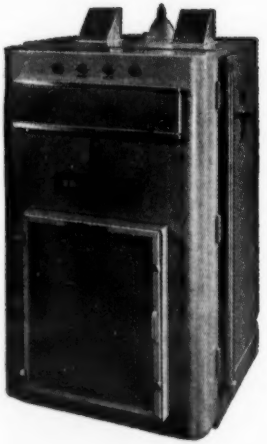

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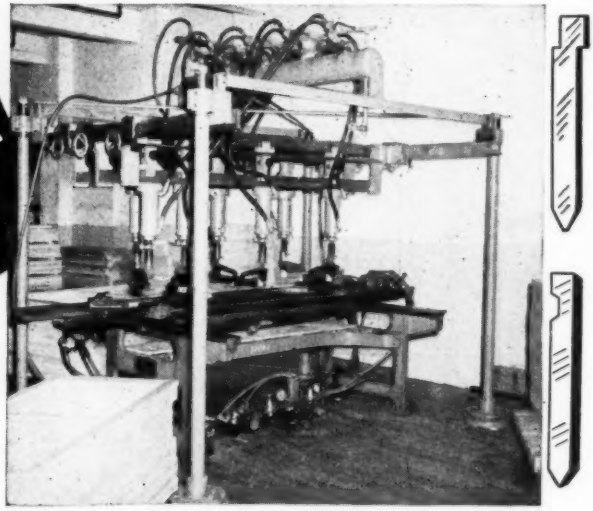

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What is CARBIDE?

By Arthur R. Segal

The author, Arthur R. Segal, a graduate of the College of Engineering (mechanical), Bachelor of Science degree, University of Illinois, worked with carbide in its applications to cutting tools as a research and development engineer in the metalworking field, prior to World War II. Mr. Segal founded North American Products Corp., Edwardsville, Ill., a company devoted exclusively to the manufacture of carbide tools, and throughout World War II, designed and produced solid carbide type and tipped milling cutters and saws for the machining of metals.

The company's wide experience with the carbides and tool design developed in the metal cutting field was significant in the design and construction of the "Woodsman" line of carbide saws and tools in the woodworking, plastic, and graphic arts industries, and resulted in the granting of a number of patents on blade designs applicable to those industries.

ALTHOUGH there are fine articles and technical papers on carbide, the majority of people have not the time to delve into these, nor are they concerned with its deeper technical aspects. There are many who have used carbide and are familiar with its wonderful performance. There are others who have heard of it and would like information about this material in simple terms.

Understanding Carbides

Lack of understanding creates a barrier to acceptance and proper usage. In the case of carbide cutting tools, many departments are being unnecessarily denied the experience-proven, cost-reducing benefits available by their use. The familiarity we all like to have before we "jump into something" is not too readily obtained. The metalworking field, where carbide was brought through its early development stages, and where it was confined because of World War II, went through the same stages of "cautious acceptance." Today, this industry uses carbide cutting tools as "matter of fact," as high speed steel tools were used before. The mining and oil industries are steady advocates of carbide tools. The woodworking field is almost through the last phase of acceptance, and the printing field and others are well into its adoption.

The article on carbide in the March issue of "Readers Digest," reflected that we are now in the "Carbide Era." As true as that seems, we, in point of years, are only on the threshold of such an era.

Actually, carbide tools might be dated from the beginning of its general acceptance and usage in the metalworking field, about a year after the beginning of World War II. Carbide—the hardest metal known to man, discovered in his search for a substitute for diamonds in industry is considered one of the ten most important developments of World War II. Its phenomenal use in such a short period of time is due to its unusual characteristics, which made possible increases in production of 300% to 1,500%. The accumulated story of the men who manufacture carbide, their associates, and the men in industry responsible for its development during its experimental phase, would be as interesting as the story of the metal itself.

History of Carbide

The original patents on tungsten carbide, known then as "Strauss Metals," were granted to Prof. Strauss, of the Osram Lamp Company, of Berlin. Diamonds used in drawing dies for the very fine and thin tungsten lamp filament wires, became extremely scarce in Germany during World War I. In the search for a substitute, tungsten carbide was found successful and, around 1925 or 1926, the patent rights were purchased from the Osram Company by the Krupp Works, who exhibited the material for the first time in public at the Leipzig Fair of 1927 under actual working conditions as a cutting tool. This new metal, under the trade name of "Widia" (a contraction of two German words "Wie Diamant," or "like a diamond), was introduced in America in 1928 by General Electric Company under a franchise agreement with the German company.

Carboloy, Inc., a department of General Electric Company, was the first to produce carbide commercially in this country under the trade name "Carboloy," in 1928, and Firth Sterling, Inc. (trade name "Firthite"), entered into the manufacture of carbide in 1929. Considering the value of the dollar at that time, the price of $454.00 per pound, did not help promote its development in industry. Today, the price is about $30.00 per pound, although it still is actually sold by the gram weight, as a carry-over from its foreign derivation.

The early trials had sufficient success to show carbide's potential value and keep the stouthearted believers pushing on, but there were many failures. No one knew how to shape or sharpen this hard material without chipping or cracking the surface, and as with all new things, everything had to be done wrong first in order to find the correct method. The early "carbide" process was quite crude in comparison with today's methods. The carbide was inconsistent in hardness and wear qualities from one lot to another. Almost all early experimental work was confined to tests of carbide tips in single point lathe tools. Even the method and materials for brazing the tips to the steel shanks had to be developed to prevent "burning" and cracking of the tip, which ruined the carbide, even before it reached the sharpening stage.

Grinding Wheels Developed

Soon after the beginning of the development period of carbide in America, grinding wheels of silicon carbide abrasive were being improved to sharpen carbide tools. A. C. Wickman Company Limited, of Coventry, England, produced a diamond impregnated grinding wheel in their efforts to solve the "carbide problem." The diamonds were first imbedded in a soft, metal matrix, similar to the metal bonded wheels of today. These were followed by a resin-plastic (resinoid) bond and, much later, by vitrified bonded wheels. The advent of the diamond wheel and its subsequent production and refinement by the Norton Company, the Carborundum Com-

pany, and others mentioned later, were the greatest factors in deriving the maximum cutting performance of carbide tools.

Tantalum-Carbide Solves Problem

The straight tungsten-carbide grade, though showing amazing results on cast irons and non-ferrous metals, did not produce well on steel, due to the welding of chip to tool, pulling out flakes of carbide, thus forming a "crater," which eventually broke down the cutting edge. In 1930 a great milepost and, perhaps, the turning point for the future successes of carbide came with the solution of this problem. In America, the developments by the late Dr. Clarence W. Balke, director of research for the Fansteel Metallurgical Corporation, and the separate discoveries and patent by Philip M. McKenna, then connected with the Vanadium Alloy Steel Company, resulted in the introduction of tantalum-carbide. This additive gave the first successful steel-cutting grades of carbide. In Germany, Dr. Schwartzkopf, pursuing the same problem, originated the so-called "tri-carbide" patents, and the combination of tungsten-titanium-tantalum carbides, which were first licensed to Deutsche Ederstahlwerke. The Krupp Works was licensed later and still later, most of the American carbide manufacturers.

Titanium-carbide was found to have a similar effect and, being cheaper than tantalum, has become very widely used in the steel-cutting grades, although additions of tantalum-carbide are frequently made. Philip M. McKenna, in the late 1930's, devised another process for making a combined tungsten-titanium-carbide. These carbides gave the metal what might be incompletely described as a self-lubricating characteristic that eliminated the "build-up" and "crater" factors encountered in the cutting of steels with the straight tungsten-carbide. As a result of these significant discoveries, carbide development again jumped forward and, for the first time in many years of financial losses, the faith of a few men in this remarkable new metal became justified as reports of phenomenal tool life appeared in the auto and aircraft fields. In the early 1930's, Vascoloy-Ramet Company (trade name "Vascoloy"), emerged from the combination of Fansteel Company's "Ramet" carbide division, and Vanadium Alloys Steel Company's "Vascoloy" carbide division. In the mid 1930's, Willey Carbide Tool Company was incorporated and, soon thereafter, McKenna Metals Company (trade name "Kennametal"), today known as Kennametal, Inc., was founded.

Carbide "Must" in War

Several years later, Pearl Harbor and war, with a never-fully-satisfied, critical lack of armaments, put a demand on American production that made carbide a "must." Although carbide might have been better known earlier outside the metalworking field under other conditions, the demands of war for high production, gave the impetus for its phenomenal development in so short a time. Other companies entered the manufacturing field of carbide, such as Metal Carbides Corporation (trade name Talide"); Wesson Metal Corporation (trade name "Carmet"); and Adamas Carbide Corporation (trade name "Adamas"). All of these firms entered into carbide's development.

Carbide went from lathe tools into milling cutters, drawing dies, wear parts. The results were so astounding in comparison to previous limitations as to tag carbide a "miracle metal." It was not unusual to see experienced machine operators back away from the controls, when told to set the machine speeds and feeds 7, 10 and 20 times faster than they ever operated machines before. It was fantastic to see carbide bite so fast that steel chips, purple from the intense heat,

sprang out of the cutters like water out of a fire hose.

Production increases were phenomenal, and that alone was only part of the story. Finishes were improved to almost a rough-ground condition and, often, even better, and most important, downtime, where production stands still until dull cutters are replaced with sharp ones, was cut unbelievably. The high wear resistance, coupled with new tool designs for the faster operation, raised the number of cuts made from one sharpening several hundred percent with carbide. Metals, never before practical to machine, became standard operations with carbide. Ceramics and glass could be machined and even threaded.

Industry Limits Carbide

Industry also determined carbide's limitations, as well as its uses. Poorly maintained equipment with worn shafts, flimsy castings that vibrated when cut, weak fixtures that did not hold the work piece solidly, poorly made tools, tools of wrong design, wrong grades of carbide, all wrecked carbide; and, in many cases, high speed steel was, and still is, the only answer. In fact, carbide failures, which were no fault of the carbide itself but entirely attributed to mis-application, resulted then, and results now, in the sometimes-heard inference that the metal has been "oversold."

Perhaps, in some cases, this is true. However, for every carbide failure there have been a thousand successes. In many cases of failure, the error lay in the "one-shot-only" test, where failure was assumed—not proven. One of the greatest detriments to success with carbide lies in its cost of development. Were it not for the early sharing-of-cost by industry and the carbide manufacturer, neither could have stood the load alone, and the gains of today would be non-existent. Of most prominence and importance, has been the cooperation of the industrial firms with the tool manufactures and the carbide manufacturers to work out the "bugs" together. Both share in the result, and the public as a whole, benefits by better appliances, homes, furniture and textiles that would have been otherwise in the luxury, rather than the "standard-of-living" classification.

The modern laminated plastic top dinette sets and kitchen cabinet tops, beautiful in color and durable, are examples of carbide's potentialities. The old way of production, by hand finishing with files, because of the chipping of the plastic by steel tools, was long, tedious and expensive. Carbide tipped saws and router tools eliminated the chipping, eliminated the hours of hand work, made the workers' jobs easier, the production of tops increased to high production operations, and prices came into the "every home" range. The demand increased, a new market was born, jobs were created, and like every other development where man-hours are saved in production, everyone gained.

Grades and Terms

Carbide is often mispronounced "carbite," "carbon" and often referred to as "Carboloy." Referring to carbide as "Carboloy," is like the general usage of the name "Frigidaire" for all electric ice boxes. Both are well chosen trade names, associated with a product so long that it symbolizes all similar products of other manufacture. The correct term is "carbide," "cemented carbide," or "sintered carbide" and it is in no way associated with the calcium-carbide used in miners' lamps, also called "carbide." Although, in the early stages, carbides differed from one manufacturer to another, today the comparative grades are quite similar in physical characteristics. This is also true in diamond grinding wheels, and they are made in

a variety of shapes, grit sizes and grades in both metal bond and resinoid bond by such companies as the Norton Company, the Carborundum Company, the Wickman Manufacturing Company, Bay State Abrasive Products Company, J. K. Smit & Sons, Inc., U. S. Diamond Wheel Co., Raybestos-Manhattan, Inc., Precision Diamond Wheel Company, Action Diamond Wheel Company, A.I.T. Diamond Wheel Company, Apex Diamond Tool Company and others. Several of these companies also produce diamond wheels of the vitrified bond.

Carbide manufacturers list their various grades mainly in terms of their application to the cutting of metals. This is due, of course, to the development of carbide in that field. The carbides available range from the hard, wear-resistant grades that are more brittle and more subject to chipping, to the softer but tougher and less wear-resistant grades that can take the heavy cutting and shock loads with less danger of chipping.

All grades, of course, are hard and run up into the 85 to 93 Rockwell A hardness range (67 to 80 Rockwell C scale). Even the softer grades of carbide are far beyond the hardest of the hardened tool steels. The selection of the proper grade of carbide is, like everything else, a matter of common-sense analysis. The object, of course, is to obtain the most wear resistant grade that will do the job without chipping the carbide. A general guide to proper grade selection is the harder the material being cut, the softer the carbide must be to give the desired results. The correct grade is most often arrived at from experience, and almost always tool design can be properly used to reduce cutting pressures which aid in arriving at maximum economy operation.

"I don't want to crowd you for innovations so let's put it this way—whoever comes up with the best cost-cutter goes to the bottom of the list of expendables. Fair enough?"

Savings with Carbide

Carbide tools are as simple and easy to use and handle as any steel tool ever made. Because their cost is higher than the cost of the steel tool counterpart, and because they cannot be sharpened by the usual technique and wheels used for steel tools and, perhaps, mostly for lack of understanding and familiarity with carbide itself, the conversion to carbide tools is often rejected. As has been proven over and over, the initial cost of the tool is repaid in savings within a short time. If one could see the on-the-job reports turned in by carbide salesmen to their companies and get the actual comparison of operation figures from all the firms who have converted, there would be revealed a convincing story of economy.

Here is a quotation summarizing the results of actual tests made during 1953.

"Carbide vs. Steel Means 93.5% Less Maintenance. Study of a rip saw operation using both carbide tipped and conventional steel saws showed: Cost of saw—carbide $142.30, steel $11.63; cost of single sharpening each saw—carbide $7.00, steel $.74; cost of sharpening for 1,000 hours of operation—steel $64.17,

carbide $9.80; cost of removal, sharpening and replacement per 1,000 hours of operation—steel $137.50, carbide $8.86."

This study, of course, may or may not be equalled in every instance. In many actual cases, however, the above savings have been exceeded, and there are cases where carbide should not have been used at all where complete failure occurred with a sustained loss in dollars, but not in experience that has "paid off" later. The chances of mis-application today are small by way of comparison to three to five years ago, by conservatively a hundred to one, due to the greater knowledge, better design and clearer understanding by people who handle the product.

Handle with Care

Considering the difference in grinding methods, one must be fair in admitting that any tool, steel or otherwise, requires care in sharpening. The difference in using a diamond wheel, as compared to any other wheel, is merely in the rate of feed. It is true that rigidity is important to prevent vibration between the wheel and tool, also that fine grit wheels should be used in the finishing operation, but that is, also, true for correct grinding of any tool. The fact that carbide tools are more sensitive to good grinding practice than high speed steel tools is more of an assurance of economy than a detriment.

Carbide tools also require care in handling, for although they will cut metals, the sharp cutting edges will chip if subjected to sudden shock, such as tossing the tool onto a metal table or striking the tips with a wrench. The same practice will, however, result in damage to the cutting edges of high speed steel cutters. Although such abuse of high speed steel tools is common, the same education of proper tool care required for carbide would certainly result in an amazing saving for all types of tools, and should be recognized for its economies and benefits, rather than a reason for rejection of further savings.

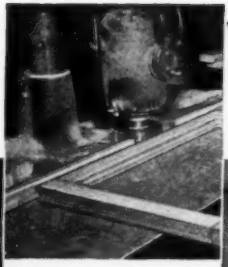
Make-up of Carbide

A general observation of the make-up of carbide may provide a clearer conception of its use. Tungsten and cobalt and carbon have all been alloyed in steels, but the maximum hardness developed is far below that attained by the direct combination of tungsten and carbide to form the tungsten-carbide. The cast cutting alloy, such as tantung, stellite, and others use an additive of tungsten-carbide, among other combinations, to produce a harder wear-resistant metal than high speed steel, but none attains the hardness characteristics of "sintered carbide."

A "sintered" product is quite different from one made by the melting process, such as used in making steel. Carbides are made by a process known as powder metallurgy, the essential feature of which is that the powders are pressed compact, usually approximating the desired shape, which are then heated in a controlled, non-oxidizing atmosphere to effect what is called "sintering." In this sintering operation there may be melting of some or none of the material, but never fusion of all. The particles grow or weld together, the compact shrinks, increases in density by elimination of voids or porosity, and develops full hardness.

Characteristics of Carbides

Carbides do not become hard by heat treatment, as that term is used with the hardening of steel. Carbide particles are permanently hard because of their chemical nature. They cannot be softened by annealing. It is natural that carbide—a sintered product—can stand extremely high pressures tending to compress it. It cannot stand very heavy forces tending to pull it apart, or forces tending to shear it in two. This does



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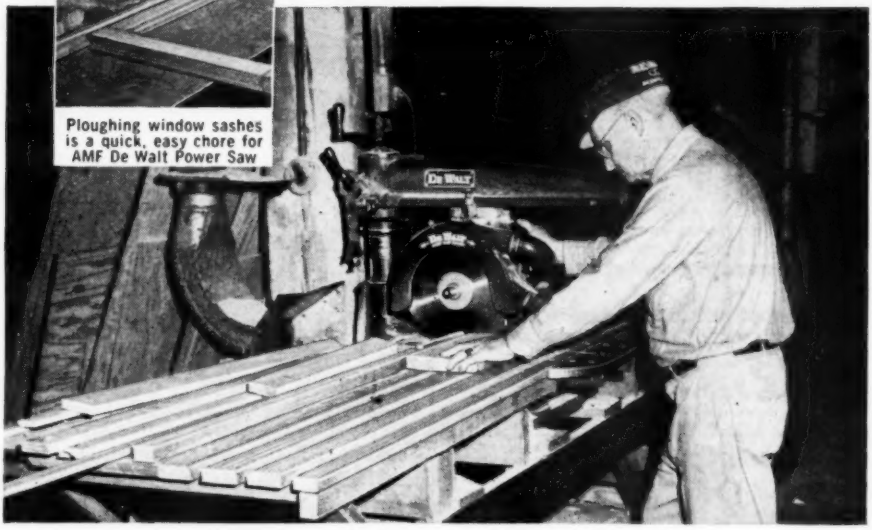

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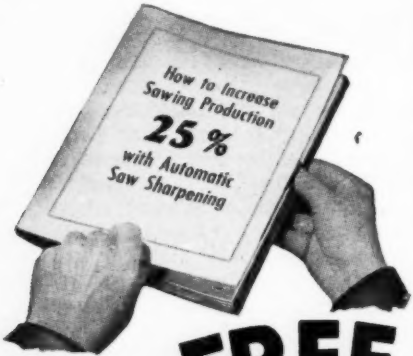

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not mean complete weakness in tensile and shear strength, but does imply that carbide tools must be made to provide full support to the carbide tips, and solid carbide should be considered as impossible to bend, although particular grades can be somewhat reformed by bending or twisting under heat. Carbide has very little ability to withstand twisting or torsional stresses, and th's should be considered by giving flat, full bearing support to any solid carbide blades when being held by wedges or screws.

Most of these above mentioned characteristics are of importance to the tool designer and manufacturer, although such information also has a practical value to the user in that it is easier to handle and use carbide correctly if there is an understanding as to why it should be so handled and used. For the user, these facts are important. Carbide can be operated either with or without a coolant. Although coolants will extend carbide life ten percent or more, it is better not to use any coolant than too little. Carbide cannot stand shock too well, and thermal shock, as well as mechanical shock, will crack carbide. In the grinding of carbides, either grind dry, or use ample quantities of coolant. Plain water is as good as anything, for carbide does not rust, but never get the carbide hot and then quench it. Invisible hair-line cracks, called "heat checks," will develop, causing the carbide surfaces to spall off under cutting loads. By spalling, is meant that thin flakes will break out of the surface, rather than chips which are deep and confined to edges of the carbide.

Process of Manufacture

Properly handled in grinding, or on the job, carbide does not have to be "babied," just not abused. Although its general classification as a "sintered product" was briefly discussed above, the following is a very general descrip-

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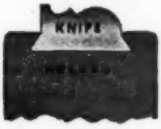

ABOVE diagrams show how a knife is moved forward to take up for wear, yet without change of cutting angle. **LEFT** diagram shows positive, safe grip of knife by the holder.

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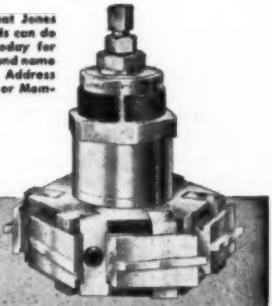

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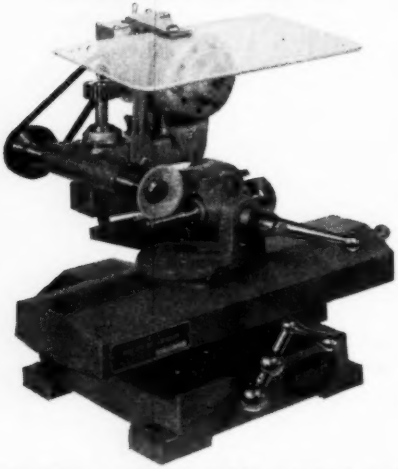

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tion of the process of manufacture:

1. Tungsten ore, either Wolframite or Scheelite, is crushed and treated chemically to produce tungstic oxide or acid, which is then reduced by pure hydrogen gas in special furnaces to form tungsten metal powder. Several grades of powder, varying in fineness for different uses, are made.

2. The tungsten powder is then mixed thoroughly with the proper amount of pure carbon in the form of lampblack, and in a high temperature furnace (2800° to 3000° F.) operation, the two elements chemically combine to form tungsten-carbide, also in powder form.

3. Cobalt oxide is then reduced by the same method as the tungsten oxide described above, except at a much lower temperature.

4. The tungsten-carbide and the cobalt powders are then mixed in the proportions to produce the particular grade of carbide desired, and the powders are pulverized and mixed by ball milling. In this operation, carbide balls are tumbled in the powder inside a revolving steel drum for long periods of time, ranging from three to six days. Thus, the carbide particles are coated with the cobalt bond and the agglomerate broken down into finer and finer particles until it can pass through screens as fine as 3,000 to 12,000 mesh.

5. After final blending, the powder is stored in airtight containers preparatory to production of the carbide blanks.

The carbide so formed is a straight tungsten-carbide type. The production of tungsten-titanium-carbides, and tungsten-tantalum-carbides, or combinations of both the titanium-tantalum elements, varies from the basic process described by introduction of these individual components in the form of titanium-carbide powder and tantalum-carbide powder prior to the ball-milling operation.

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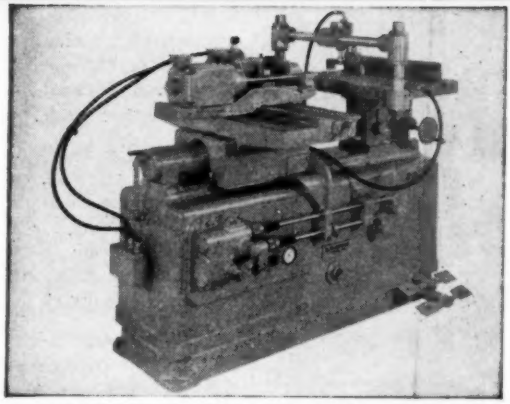

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The cobalt, acting as a binder, is actually the softest link in the carbides, since it does not have the hardness or wear resistance of the tungsten-carbide. It does have a "red hardness," meaning ability to remain hard at high temperatures, and provides a better bond for cutting tool purposes than other known agents. By varying the percentage of cobalt, carbides can be made into different grades which the manufacturer, through accumulated experience, has set up to meet the more common applications. Increasing the amount of cobalt produces softer grades of carbide, which are tougher and can take heavy shock loads without chipping. As the cobalt is increased, wear resistance decreases. The opposite characteristics are obtained by decreasing the percentages of cobalt. That is, the carbide is harder and more wear-resistant, but is much more brittle

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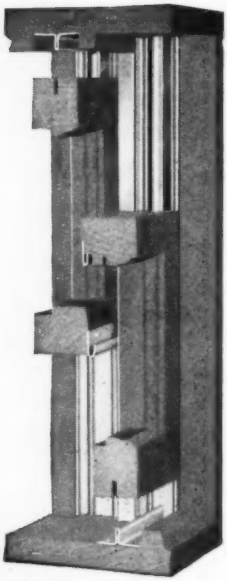

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and will chip easily if subjected to heavy shock loads. The physical characteristics are also regulated by other factors, such as the fineness to which the powders are reduced in the ball-milling operation, the refinement of the materials to eliminate impurities, and the addition of tantalum-titanium, and the sintering cycle used in the following description of the final phase of the process:

1. Extrusion, in which the pre-sintered powder in a paste form is pushed under high pressure through a shaped hole in a die head which forms it into tubes, solid rounds, etc., not particularly adaptable to other methods of forming, because of shape or length.

2. Cold-press method, used for the majority of carbide products, in which the powders are pressed into a die shaped to the form desired.

3. The hot-press method, which is expensive, but provides greatest accuracy and density. It is similar in action to the cold-press method, except that the sintering heat is applied while the pressure is maintained on the powder.

In the cold-press processing, the compressed powder shapes, light gray in color, are set in graphite trays which are loaded into pre-sintering furnaces. The pre-sintering is done at around 900 degrees F. in a non-oxidizing atmosphere for a period varying from 4 to 12 hours, depending on the manufacturer and grade of carbide being made. After cooling, the pre-sintered carbide looks and feels like pieces of gray chalk and, like chalk, it can be shaped easily in this condition. Small orders of special shapes are actually "preformed" as this method is termed, when the carbide is in this condition. Any powder removed at this stage can be recovered after cleaning and used over.

The final step is the sintering of the shape at high temperature (approximately 2600 degrees F.) in a non-oxidizing atmosphere for periods, again varied according to the manufacturer, but ranging from 1 to 12 hours.

When the carbide is removed from the last sintering operation, it is in the hard condition, ready for use after finish grinding to one of the thousands of applications for which the blank was made.

During the sintering operation, the carbide shrinks in volume from about 15 to 23 percent, depending upon its analysis and sintering cycle. The manufacturer allows for this shrinkage, and the carbide blank is generally furnished about .010" oversize to allow for its final grinding.

These descriptions are not intended to designate any particular method, nor to provide any details concerning the methods of manufacture. The only thought is to provide a surface knowledge of the product, and eliminate the vagueness that seems to surround it to cause apprehension concerning its use.

There is much more to carbide that lies in proper tool design to provide the maximum efficiency in its operation. The carbide companies have provided the material, the grinding wheel manufacturers have developed diamond wheels, and the tool manufacturers can provide the experience in design engineering to meet the requirements of tool applications in industry.

Carbide comes close to being the "Genie," giant servant of Aladdin's lamp, in the fairy tales of the "Arabian Nights." Now, however, you can possess the lamp and can command this giant of modern progress to serve you.

This is the first article in a three-part series. Within the next several months we shall be presenting Mr. Segal's second article.

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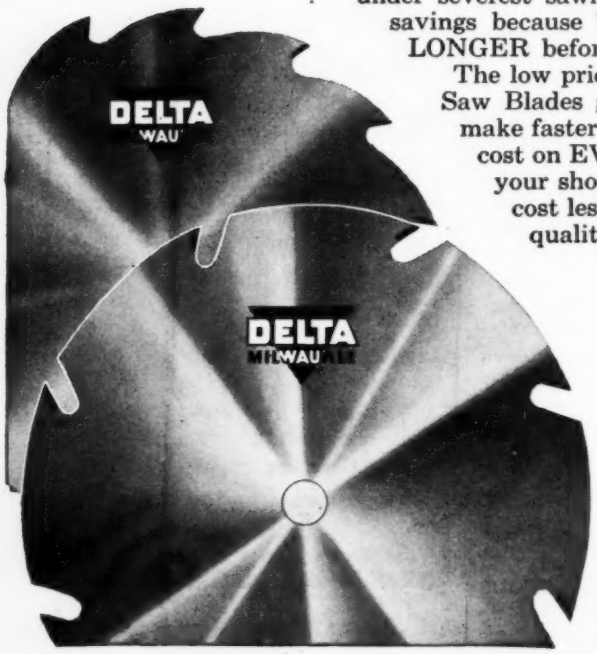

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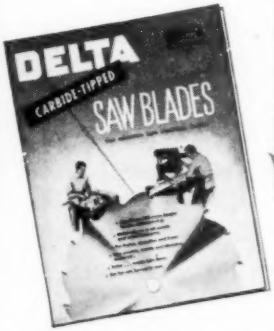

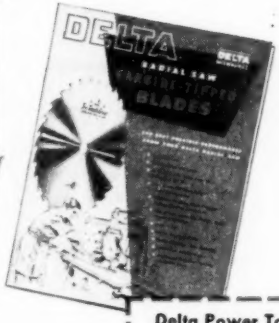

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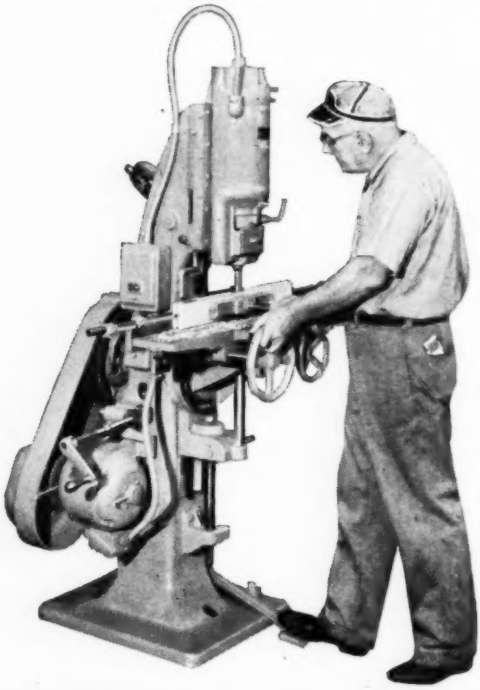

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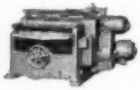

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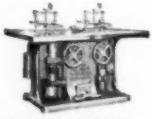

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The Chicago MARKET

By E. McDaniel

IT IS too early at this writing to properly evaluate the Chicago Market or to make predictions as to what lies ahead of the furniture industry in the remaining months of 1954. However, as June 21 dawned hot and humid in Chicago, hundreds of buyers crowded into the American Furniture Mart to replenish their stocks from the thousands of items being offered at this Market.

Huge vans that clogged streets around the American Furniture Mart had unloaded more new merchandise than has been seen since World War II. Manufacturers knew that they had to have additional incentives—designs, etc.—and lures to step up buying.

General Lawrence H. Whiting, president of the American Furniture Mart, believed that cautious optimism would be felt throughout the Market. A period of inventory adjustment by home goods retailers is nearing its end. Retail sales during the first quarter of 1953 were off about 10% from the high levels of a year ago, but inventories have also dipped so that now dealers should be in a relatively more favorable position to buy. Orders in the second quarter should more closely approximate actual sales. In the event of a business upturn, which many are expecting, the pickup could be quite sharp.

Widespread reserve cash holdings in public hands, the continued high birth rate, formation of new households and new housing starts are other reasons for belief that there will be quick response by the industry to signs of improvement elsewhere.

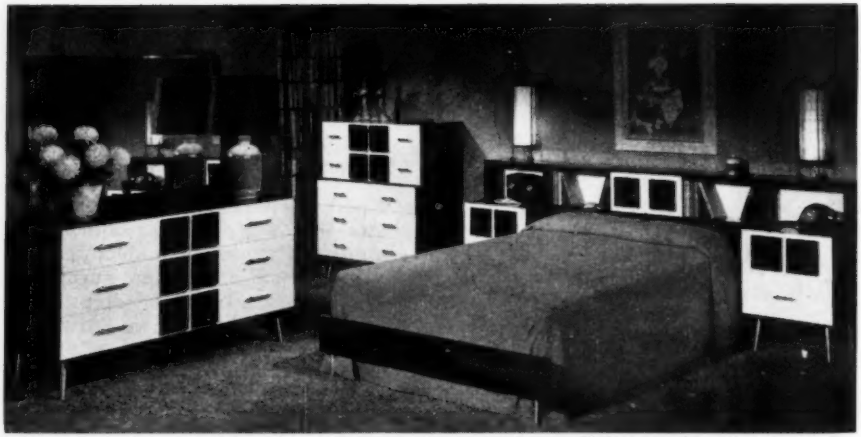
A quick look at the summer markets shows that this feeling is quite general. An outstanding manufacturer from the south said, "Business during the last six months of 1954 will be equal to or slightly better than during the same period in 1953."

A western manufacturer spoke along the same line, saying, "Barring unforeseen circumstances, such as participation in the Indo-China war, the outlook for retail furniture business during the ast half of 1954 is exceptionally good."

Many of the eastern manufacturers—Pennsylvania area particularly—believe that while business is down from last year, we have reached the bottom of the cycle and the second half of 1954 will bring an upturn. The general picture in this furniture-producing area was one of stepped-up activity in preparation for fall sales.

John Snow, executive head of the National Association of Furniture Manufacturers said that the realistic furniture manufacturer is looking toward the last half of 1954 with a good deal of optimism.

"This optimism," he said, "is based on the strong showing which the industry has made this year in comparison with the same period in 1952. A careful study of the statistics shows that the industry is gradually narrowing the gap in volume of orders received to a point where the difference between last year and this year has been narrowed from 31% in January to 18% or less at present. . . . Basis for optimism is that manufacturers have assumed the aggressive attitude needed to



Decorator colors used for this suite are ebony and snowflake maple; siesta sherry; Bermuda blue; princewood and Persian blue. The triple dresser has nine drawers. Legs are solid brushed brass.

meet the current competitive conditions."

Buyers arriving at the Market brought with them reports of better business in many parts of the country. Others interviewed expressed the view that this Market would not see much of the kind of "sampling" that went on last January. Buying would not be sensational, but it would be steady and stable.

Furniture business this year has been best in towns between 5,000 and 20,000 population. Sales have been slowest in large industrial areas and fairly good in rural centers.

Trade-Ins Help Business

Trade-in policies were especially stressed at this Market and a number of dealers showed how this had helped business. Appliance trade-ins have been quite common in the past. However, dealers were urged to think of accepting furniture, bedding and carpeting for resale. There should be some margin of profit after the trade-ins have had necessary refinishing or cleaning. The policy has definitely helped some dealers to better sales. Some furniture stores have a basement or warehouse set aside for the resale business and have found it to be a profitable operation.

Styles and Trends

There was a fine new enthusiasm for the combination of traditional beauty with up-to-date comfort in the utilization of Duncan Phyfe and stain-resistant plastic, Queen Anne wing backs and foam rubber. Traditional styles were surprisingly apparent in houses which have in the past been devoted entirely to contemporary.

This portion of our article will describe some of the new offerings and general observations made by your reporter in a day's tour of the Mart. To begin with, this year's show offers the greatest number of new samples ever exhibited!

Oversize furniture was notable for offering in one piece the storage or seating capacity that several small pieces would have in less space. Dressers have grown longer, and 72" ones are not uncommon. Sofas, tables and lamps are also found in king sizes.

Surfaces impervious to stains, spills,

Sawbuck dining room suite by Stewartstown. It is available in topaz mahogany, bone white, black and white and cherry. All pieces have legs tipped with brass.

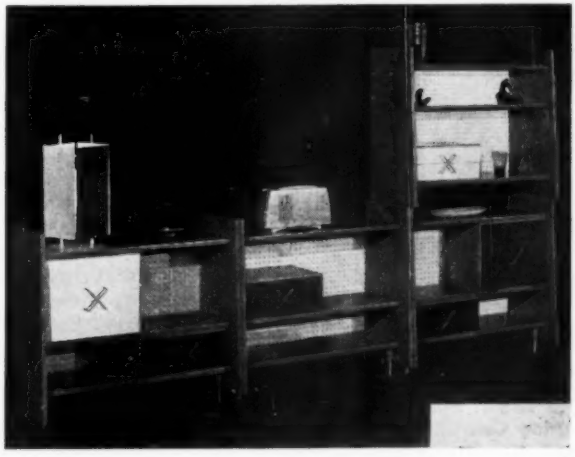
burns and hard knocks are the answer to the homemaker's dream. Flagstone, marble and glass as well as plastics are being used in various tops.

This Market is seeing many items with Oriental influence in bedroom, dining room and living room suites. No longer confined exclusively to black lacquer, the Chinese influence comes also in delicate sable, gray, and, notably, a rich, full grained walnut tone. Nappanee Lumber & Manufacturing Co., Nappanee, Ind., used a pagoda style head and foot rails on bed and crib. A grill on the footboard is set into fluted end panels and leg stretchers are of wrought iron.

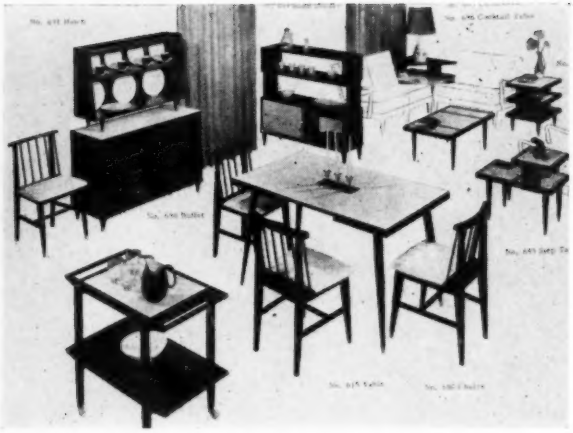
More convenience features were present in furniture at all price brackets—silver compartments in buffets, jewel boxes in dressers, etc.

In finishes black and white and all the shades between, the grays, the silvers, the smoke tones, sable finishes and variations of silver fox were evident in every price range. These finishes are being used on mahogany, walnut and oak. They were seen in both glossy and dull surfaces.

A new item which should sell well



This room divider has three basic units: drawer, door and case. They can be arranged in a number of ways and combine wood finish and decorator colors on drawer and door fronts—turquoise, terra cotta, white and gray accents with limed oak, platinum walnut and maple. It is made by the Ashley Furniture Corp., Chicago.



Black and white were a strong factor at the Market. The Lexington Chair Co. showed this open-stock junior dining room grouping.

is a collapsible plywood crib made by Krib-A-Bed, Inc., Minneapolis. This is a plywood frame with waterproof plastic snap-on bottom which can be put on a bed or any flat surface. The entire crib packs into a cloth bag.

One firm is offering solid Honduras mahogany bedroom furniture made from dimension stock imported directly from lumber mills in the heart of the Yucatan.

Wood and glass, light and dark finishes furnish contrast for this cocktail table shown at the Summer Market. The lower shelf is champagne oak, legs and frame are ebony. Made by the Tonk Manufacturing Co., Chicago.

Chipboard, the material which utilizes wood waste and is often used as a core stock for veneered furniture, is lending itself to pleasing decorative finishes as it is shown in a line of dinette table tops. Another wood with a new utilization is burled myrtle wood with the natural marking of the wood.

Something completely new for the lovers of colonial and early American furniture is shown by Pennsylvania House, Lewisburg, Pa.—two chairs with table between built all in one of warm maple. Beautiful in appearance, it is functional and a space-saver as well.

Jamestown Table Co., Jamestown, N.Y., is offering a new bedroom suite in antique white of French provincial design. In addition this firm showed a suite in Tahara mahogany with burnished silver hardware.

Danish chairs in Danish beech, sleek and sophisticated, were shown by Selig of Leominster, Mass. This company also had a complete collection of upholstered items covered with shag rug material.

Another unusual dining room suite was one offered by the St. John Table

Co. of Cadillac, Mich. This set was of maple finished in heather with white ceramic drawer pulls and leg tips. Chairs were upholstered in white plastic.

Pastel colors in bedroom suites were very much in evidence. American Furniture Company was one of the firms showing a pink set. Others were blue, antique white and ecru. Bone white with gold trim was also featured. African mahogany with a soft beige finish accented by smokey copper hardware was most attractive. An unusual combination of materials was seen in a room divider made of redwood and charcoal wrought iron.

The Lullabye Furniture Co. has added a feature to their cribs. It is a silent drop side where the rod in the crib travels between oil-impregnated wood felt cushions that are concealed inside the rail. No squeak to awaken baby. We have wondered how soon furniture manufacturers would take advantage of lignum vitae for such various applications where two wood surfaces must slide over one another.

In the Modern motif, the Troy Sunshade Co. offered a dinette set—tough but fragile-looking—with wrought iron legs and gold anodized feet, shaped, natural plywood seats and back with transparent glass table top.

Snack tables in pie or square shapes were featured by Krebs, Stengel & Co. It is possible to use these tables individually or to fit them together to form almost any size or shape. The tables were made in two-tone combinations of walnut or oak with Nevamar plastic tops. Other interesting tables were in black with limed oak trim. Stark contrast is used in other tables by Philip Reinisch Co. with white plastic tops and black or cordovan mahogany bodies with brass grill and leg tips.

Other unusual combinations of materials were shown by the Vaughan-Bassett Furniture Co., Inc. This company had several new series in bedroom sets—one a charming combination of white with Haiti walnut or white with cherry cordovan. Other suites were pearl gray, limed oak or wild rose.

Studio bed with frame of ash and birch. Wood has been steam bent to shape.

Jasper Cabinet Co. was one of the firms featuring chipcore. Dinette tables by this firm had chipcore tops and were finished in soft colors and protective finishes.

Hardware

Hardware is more important than ever. The metals used at this market included steel, chrome, brushed aluminum, nickel and pewter. Silver tones predominated. Manufacturers of hardware are supplying a wider range of finishes than they have for several years.

From the forms of the pulls as well as the materials used one finds clues to the prominent furniture styles. Some of the shapes seen were hourglass type drawer pulls; brass with white porcelain; marbelized plastic pulls; cane wrapped brass; enameled pulls to imitate leather; silver balls combined with black bar; plastic leather straps and variations of copper and brass.

Fall Business Good

The furniture industry—which represents a huge segment of the entire woodworking field—should feel very encouraged about the next six months. Many factors are evident which should mean better business. Now is the time to go over quality control programs and make plans to speed production in order to meet the fall pick-up which we expect will make the last half of 1954 good for all of us.

Hardwood "Jewels" Featured

A new official crown made of 11 popular cabinetwoods and set with 22 rare hardwood "jewels" was used this year for the first time to crown the annual furniture queen, at the summer furniture market.

Symbolic of the fine cabinetwoods used to manufacture quality furniture in all price ranges, the handsome new crown was donated by the Fine Hardwoods Association and will be used to crown the annual furniture queen from this year on.

This original "trophy" crown, especially designed by C. E. "Chic" Waltman of Waltman Associates, Chicago, will be on permanent display in the Furniture Club of America at the American Furniture Mart.

In presenting this crown for use in the annual crowning of the furniture industry's queen, Burdett Green, executive secretary of the Fine Hardwoods Association, announced that "This crown represents America's great furniture industry and the part that fine hardwoods have played in developing the wonderful variety of home furnishings found today in every price range and style."

The 11 sculptured points of the distinctive crown are made of the 11 cabinetwoods most used in the furniture industry: mahogany, oak, walnut, maple, cherry, ash, birch, sycamore, poplar, beech and gum.

Crown used for crowning of the 1954 industry queen. Eleven different hardwoods were used in making the crown.

The face of each solid hardboard point has been veneered with another natural wood grain or figure pattern of the same species of hardwoods. For example, the solid walnut point features walnut burl veneer overlaid on the front within the tapered point.

Precious hardwood "jewels" are set around the gracefuly shaped solid mahogany base of the crown. These jewels represent the rarer wood species used in the furniture industry primarily for inlays or overlays, or for more expensive decorator lines of furniture.

Natural colors of these 22 hardwood "jewels" range from the lovely olive green of lignum vitae to the deep, rich purple of amaranth, and include true ivory, red, yellow and many shades from amber and topaz to rich browns and blacks.

The fine hardwoods giving this truly gem-like array of color include lignum vitae, teak, padouk, sapele, narra, ireme, boxwood, paldao, koa, rosewood, myrtle, prima vera, zebrawood, amaranth, laurel, satinwood, bubinga, orientalwood, balche, holly, butternut and tigerwood.

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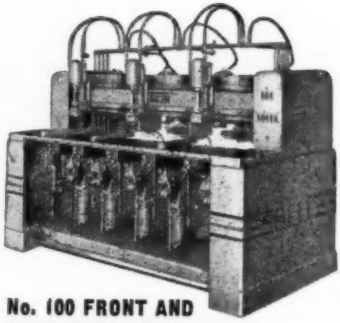

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Evolution of LUMBER DRYING TECHNIQUES and DRY KILNS

Part 8

By Paul H. Graham

THIS investigation into the development of dry kiln heat sources and kiln heating systems uncovered some basic principles which seem to be generally accepted and worthy of consideration at this time.

Dry Kiln Heat Sources

Heat is a form of energy that increases as temperature is increased and always flows from a high to a low temperature, increasing in flow as the difference between the two temperatures increases. Heat is transferred in only three ways: 1) conduction, 2) convection and 3) radiation.

Conduction is essentially the transfer of heat between one body of material to another, either when in contact with it or in physical contact with an intermediate substance, due to a difference in temperature between the bodies or materials. This form of heat transfer is characterized as: thermal conductivity, thermal conductance, restivity and resistance.

Thermal conductivity is used as conductivity per square foot per hour for one inch of thickness. Thermal conductance is considered to be the over-all coefficient of conduction through a body of material for its particular thickness, generally expressed as the conductance per square foot per hour for the total thickness of the material. Restivity is considered to be equal to the reciprocal of the conductivity. Resistance is considered to be equal to the reciprocal of the conductance.

Convection is the transfer of heat to or from a body of material resulting from mass movement of a fluid in contact with it, as when the movement of the liquid is due to change in its density, caused by a temperature change. This form of heat transfer is usually termed thermal conductance.

Radiation is the transfer of heat through space caused by a temperature difference between two bodies, such as heat given off by rays of the sun or by some mechanical heating device or heat transfer system.

Heat transfer by conduction and convection is generally controlled mainly by air movement, temperature difference between air and the surface and roughness of the surface. Heat transfer by radiation between two surfaces is chiefly controlled by emissivity (character of the surfaces), temperature difference between the surfaces, and the angle at which they approach each other. The term emissivity refers to the amount of heat the surfaces will absorb according to the nature of the surfaces (color, smoothness, roughness, etc.) in relation to other factors mentioned above. Where one or both boundary

surfaces of the air space are faced with materials with low emissivity surfaces, the radiant heat transfer is greatly reduced.

In the kiln drying of lumber heat is transferred to the wood for various purposes: 1) to heat the wood substance and its contained water to the temperature of evaporation as well as to increase the rate of moisture transfusion from the wood interior to the surface; 2) to vaporize the water and evaporate the moisture as it comes to the surface; 3) to supply energy sufficient to overcome the natural hygroscopic attraction of wood for water, below the fiber saturation point (25 to 30% moisture content); 4) to make up heat losses from the kiln construction (walls, roof or ceiling, floor and doors), as well as losses resulting from ventilation; and in some dry kiln applications 5) in the form of steam for kiln humidification and conditioning treatment of lumber.

Since the rate of moisture transfusion directly affects the rate of drying and high temperatures increase the rate of moisture transfusion, it has been found that relatively high temperatures, in the range of 120 to 200 degrees F. in conventional dry kilns, are best suited for the kiln drying of lumber. The heat quantity required to vaporize and evaporate moisture of wood as it comes to the surface, commonly known as "latent heat of evaporation," amounts to about 970.2 Btu per pound of water evaporated but is usually figured at about 1,000 Btu for easier calculation.

The heat quantity generally required to overcome hygroscopic attraction of wood for water, drying from fiber saturation point (25 to 30% moisture content) to an oven dry condition (0% moisture content) is about 30 Btu, but as lumber is seldom dried much lower than 6%, this value is usually considered to be about 10 Btu. per pound of dry wood. The heat quantity required to make up heat losses from the kiln construction and to supply steam for humidification and conditioning must be calculated for the individual kiln.

Heat losses through kiln construction components occur in the form of heat transfer by a combination of conduction, convection and radiation. The ratio of the portion contributed by any of these heat transfer mediums making up the total heat loss may vary independently of the others.

Construction heat losses must be replaced at all times for efficient dry kiln operation but the drying load is spread over a period of days, so construction heat losses may well make up the major portion of the heating load. This factor has always presented a troublesome problem for dry kiln engineers but as material manufacturers began to publish thermal capacities of materials commonly used for dry kiln construction and operational-experience data was accumulated for further study and research, techniques were developed which now make it possible to calculate heat load and determine heat losses with a reasonable degree of accuracy.

Heat loss determination is based essentially upon a total resistance of heat, generally considered to be equal to the sum of the various resistances through surfaces and materials, and includes such factors as: over-all resistance of walls, roof or ceiling, floor and doors, air to air, internal restivity, internal resistance, surface or film resistance, air space resistance, and thickness of kiln construction components in inches.

In a typical on-the-job heat loss calculation for a dry kiln measuring 10 x 10 x 20 feet and of frame construction with ½-inch insulation and a 4-inch concrete floor, ceiling and walls had a heat transfer coefficient of .32, the floor a value of .66, and a single solid

Construction heat loss calculations were as follows:

Kiln walls:	500 sq. ft. x .32 x 165 degs. F.	equals	26,400 Btu/Hr.
Ceilings:	200 sq. ft. x .32 x 165 degs. F.	equals	10,560 Btu/Hr.
Floor:	200 sq. ft. x .66 x 95 degs. F.	equals	12,540 Btu/Hr.
Door:	100 sq ft. x .52 x 165 degs. F.	equals	8,580 Btu/Hr.
Infiltration:	2000 cu. ft. 1/55.6 x 165	equals	5,900 Btu/Hr.
			63,980 Btu/Hr.
Plus 10% for duct losses, etc.			6,398 Btu/Hr.
Total Construction Heat Losses			70,378 Btu/Hr.

(Courtesy: D. J. Murray Mfg. Co., Wausau, Wis.)

door a value of .52. The study was made of a winter drying operation, with an outdoor temperature of about -20 degrees F. and a kiln drying schedule calling for a maximum dry bulb temperature of 145 degrees F.

Heat sources used for the kiln drying of lumber have been determined in general by such factors as: 1) equipment available for general plant heating, 2) heat load demand of dry kilns, 3) cost of fuel and available supply, 4) cycle of kiln operation—continuous or part-time.

Basic heat sources are: 1) steam, 2) hot air, 3) hot water, 4) oil, 5) natural gas, and 6) electricity. Although it may not be ranked first in succession of development, steam is indisputably first in use for dry kiln heating.

Steam As a Heat Source

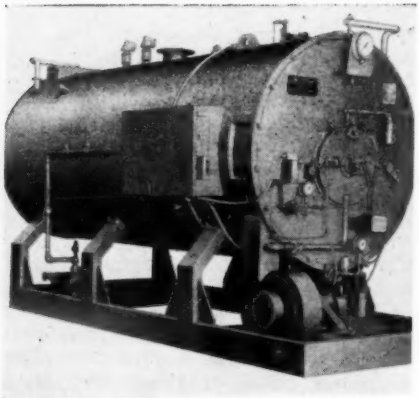
Steam for kiln drying must provide not only the heat required to evaporate moisture from the wood but also heat necessary to heat the lumber and kiln structure as well as that lost by radiation and ventilation. It is used in two states—saturated or superheated. It may be high or low pressure and may be either live or exhaust steam.

As saturated steam, it is essentially steam in contact with liquid water from which it was generated, at a temperature which is the boiling point of water and the condensing point of steam. It may be dry or wet, depending upon generating conditions, and at any pressure has a definite temperature. Dry saturated steam is steam free from mechanically mixed water particles. Wet saturated steam contains water particles in suspension.

Superheated steam is steam at any given pressure which is heated to a temperature higher than the temperature of saturated steam at that temperature and water cannot exist in the presence of it. In its application to kiln drying superheated steam is generally considered to be steam heated over and above the boiling point so that it can give up some of its heat without condensing.

To develop heat for the kiln from steam, a fire is built to heat the air flue gases which in turn heat the flues. The heated flues then heat the water and convert it into steam. The steam is then conducted through a main pipe into a series of pipes, steam coils or radiators located inside the kiln chamber. In modern kilns the air within the kiln building is then blown across the steam-heated pipes, coils, radiators, etc., by fans or blowers.

Steam for larger kilns is usually produced by burning wood waste, coal or other fuel in a Dutch oven type furnace and generating steam in fire-tube or water-tube type boilers. For the smaller dry kilns where labor cost is a large item of over-all expense, auto-



Courtesy Ames Iron Works, Oswego, N.Y.

Amesteam generator for light oil firing used for separate dry kiln steam supply.

matic steam generators are often used which supply low pressure steam and burn coal, gas or oil with automatic feed. Low pressure steam is also used in the form of exhaust steam from a turbine, pump or reciprocating engine.

Steam for heating the dry kiln may be either high pressure steam (above 10 lbs. per square inch) direct from the boiler, or low pressure steam (below 10 lbs. per square inch) which is usually in the form of exhaust steam that has passed through an engine, pump or turbine in its passage from the boiler to the dry kiln. Since steam heated kilns were first introduced, exhaust steam has been most favored mainly because of its ready availability as a by-product of the major plant heating and/or power generating system.

This is not meant to imply that low pressure steam cannot be converted from higher pressure, as this is common procedure in modern kiln installations. In a typical example, a modern dry kiln has its steam supplied direct from the boiler at 60 lbs. per square inch pressure and then reduces pressure by a reducing valve to below 10 lbs. before steam enters the kiln control valves.

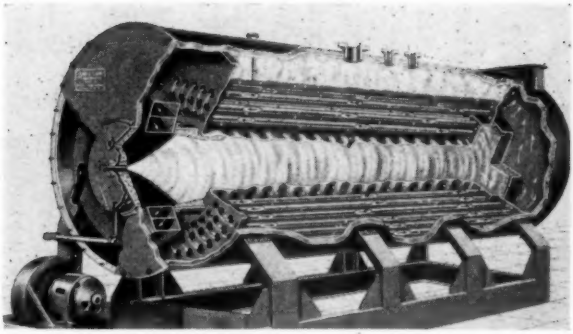
Advantages of Exhaust Steam

Exhaust steam seems to have certain advantages in kiln drying. It carries more moisture than high pressure steam direct from the boiler, chiefly water of condensation, so is favored for humidity control and conditioning treatments. One dry kiln engineer stated that its superior qualities for conditioning are due primarily to its lower temperature which makes it easier to get a high wet bulb reading without the danger of sensible heat driving the dry bulb higher and preventing the wet bulb from getting too close to the dry bulb.

This engineer said that sensible heat is the energy required to cause a temperature change, after the temperature of 212 degrees F. has been reached. He explained that 970.2 Btu is required to change one pound of water to one pound of steam and after a 212 degrees F. temperature is reached, each pound of water contains 180 Btu and this quantity of heat is known as heat of the liquid and is called "sensible heat."

When 970.2 Btu is added to each pound of water after the temperature of 212 degrees F. is reached, the liquid is changed to vapor but the temperature remains c o n s t a n t. The volume is changed. The added quantity of heat is known as the "latent heat of evaporation." As more Btu's are added to each pound of water in the vapor state and steam pressure is increased, temperature is increased and volume is conversely decreased. (These estimations were based upon changing liquid into a vapor at atmospheric pressure.)

Most authorities consulted agreed that exhaust steam generally contains more heat units than high pressure steam. Reference to steam tables gave a latent heat of vaporization value of 876.3 Btu for steam at 100 lbs. gauge but increased the value to 965.5 Btu for steam at 5 lbs. gauge. The volume of steam at 10



Cut-away view of Ame- steam generator.

lbs. gauge, however, was 16.31 cu. ft. per lb. against only 3.9 cu. ft. per lb. for steam at 100 lbs. gauge.

Therefore, exhaust or low pressure steam requires more radiation and more and larger piping than is required for high pressure steam. This requirement for more piping is not as great in the modern fan forced circulation kiln as in the older natural circulation kiln. However, heat transfer to the air is to a considerable extent dependent upon the velocity of air across the pipes.

It is recognized that steam temperature must be higher than the temperature desired in the kiln chamber to transfer heat from steam into air of the kiln. It has been learned through bitter experience that variable steam pressure cannot be supplied to the kiln for efficient operation. There must be uniform heat and pressure from the heating source.

The modern kiln steam heating system consists of a boiler or similar steam generating unit and connecting pipes which deliver steam to steam coils or radiators in the heated kiln space and a large volume of heat is produced in a relatively small coil. As condensing steam gives off latent heat to the kiln air, it is quickly replaced by the boiler or steam generator unit. The equipment is closely controlled for the delivery of the amount of heat required to dry the lumber.

It is generally conceded that steam pressure fluctuation should never be more than plus or minus 5 lbs. of the kiln pressure for which the kiln heating system is designed. It has become common practice to use a good reducing valve in the feed-line from the boiler, usually near the control valves for maintaining uniform pressures, with accurate pressure gauge being installed between the reducing and control valves.

Pressure Controllers Used

Various pressure controllers are used in modern kiln installations to automatically control the flow of steam to the heating coils. As described by one manufacturer of kiln equipment, the pressure controller functions to: 1) reduce steam and fuel consumption, 2) regulate steam pressure to suit the steam demand of the kiln, 3) give closer regulation of kiln temperature, 4) give more uniform distribution throughout the kiln, 5) reduce surge on boilers and even steam loads, and 6) maintain constant pressure on steam coils.

The steam consumption of the dry kiln is a variable quantity, according to type of kiln, species of lumber being dried, and general kiln construction and operating conditions. Smaller dry kilns generally use more steam proportionately than larger kilns, and old style kilns more than kilns of modern design. It has been estimated that the average

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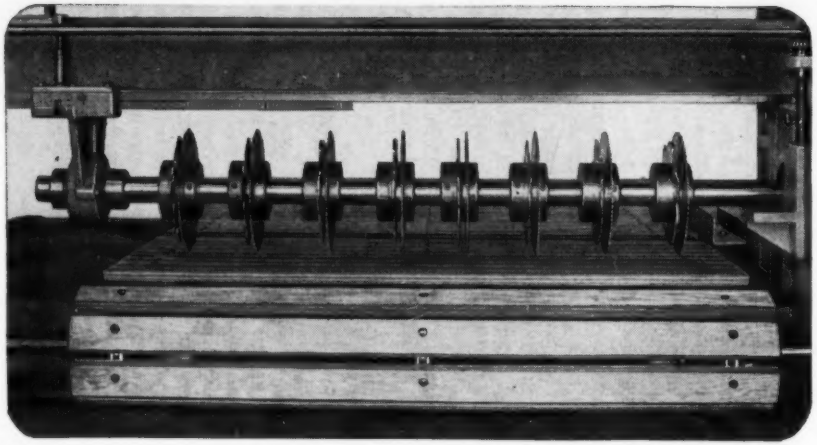

Arbor set-up for multiple drawer front work.

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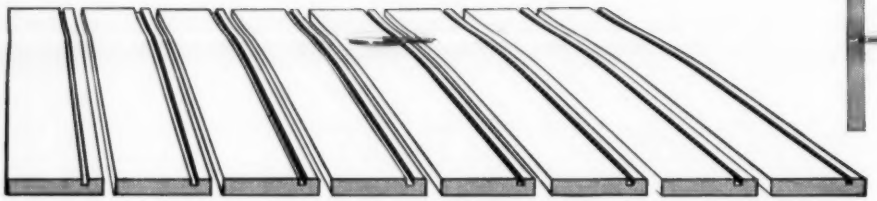
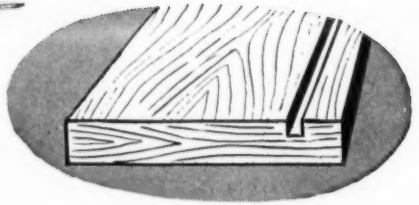
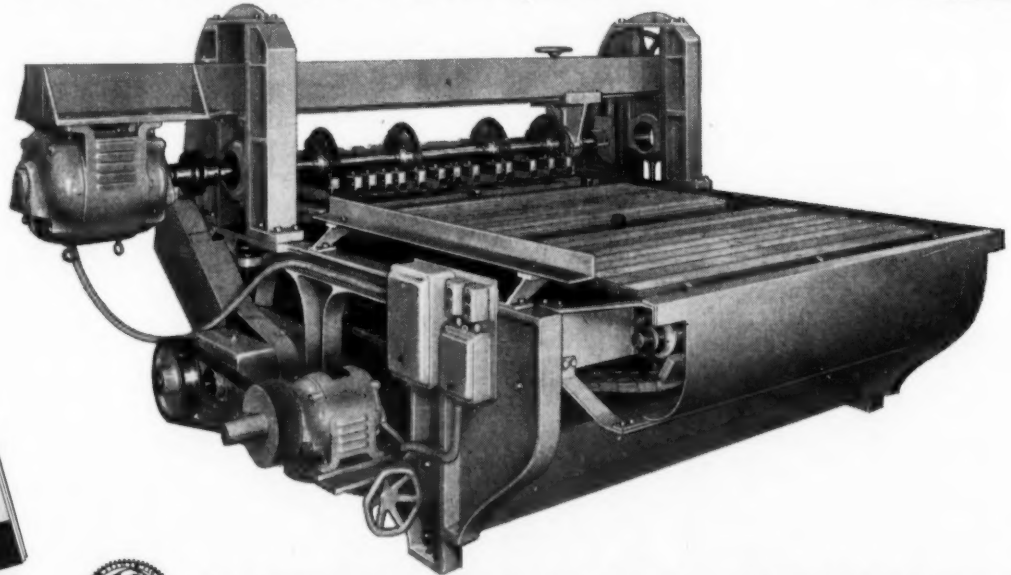
- **Rips a complete panel into bed rails in one pass.**





8 identical drawer fronts ripped and grooved in one pass.



Write for the
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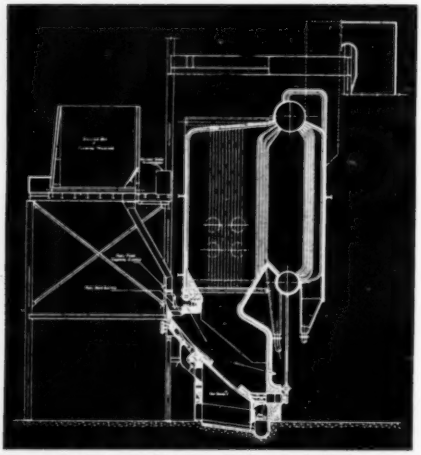
TENONERS	VENEER & PLYWOOD SIZERS & JOINTERS		RESAWS



Courtesy The Hofft Co., Richmond, Va.

Type C Hofft furnace and feeding machine layout for burning bark and wood waste is departure from conventional Dutch oven design. Furnace design incorporates the reversed fired principle with zoned control of air- water-cooled grates, side walls and dump plates.

modern dry kiln will operate with a steam consumption of about 2,000 lbs. per 1,000 board feet of some species which formerly ranged in the neighborhood of 3,000 lbs. per thousand board feet. This reduction has been effected largely through better kiln construction, better maintenance and better control. The pounds steam required to dry 1,000 board feet of lumber depends primarily on the amount of moisture evaporated from the lumber and the thermal efficiency of the kiln.

Heat source demand for steam required for kiln drying is usually in the form of boiler horsepower. Boiler horsepower is usually considered to be the evaporation of 34.48 pounds of water from 212 degrees F. into dry saturated steam at 212 degrees F. per hour. For easier calculation, a value of 34.5 is commonly used. Boiler horsepower in heat value is generally considered to be about 33,523 Btu per hour.

Although accurate calculation requires more complicated procedure and accurate values measured for all factors, a fairly accurate boiler horsepower demand is obtained by determining the area of kiln radiating surface in square feet in the heating coils or radiators, multiplying by the condensation factor (generally from 1/3 to ¾ lbs.), dividing by 34.5 and adding the amount of steam used for humidification in steam sprays or blowers.

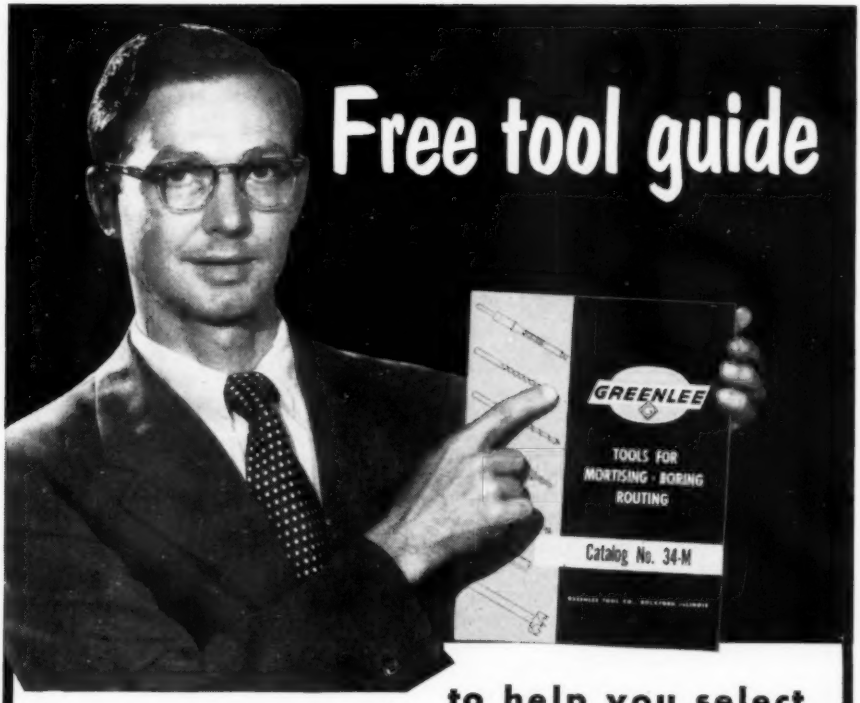
Steam boilers are rated at a nominal horsepower, usually on the basis of 10 square feet of heating surface per horsepower for water tube boilers and 12 square feet for fire tube boilers. Boiler capacity developed depends on the rate of heat transfer from the furnace gases to water inside the boiler.

A heating engineer uses the following rules of thumb to estimate boiler horsepower, where the heating surface (heating surface is considered to be two-thirds the surface of the cylinder, and the entire surface of the flues or tubes) can be determined:

1. Shell boiler—10 feet of heating surface will produce 1 h.p. To find heating surface multiply length by 2/3 of circumference.
2. Flue boiler—12 feet of heating surface will produce 1 h.p. Heating surface is 2/3 of surface of cylinder and entire surface of all the flues.
3. Tubular boiler—15 feet of heating surface will produce 1 h.p. Heating surface is 2/3 of surface of cylinder and entire surface of all the tubes.

Water requirements are based on assumption that 1 nominal horsepower requires 1 cubic foot, or 7½ gallons, of water.

It is not possible to consider in detail all improvements that have been made in every unit of steam generating equipment used to produce heat for kiln drying nor all improvements in operating methods and practices.



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TOOLS FOR CRAFTSMEN
GREENLEE

Linear Expansion of Steam Pipes

Temperature Degrees F.	Steel	Wrought Iron	Brass	Copper
20	.15	.155	.25	.25
40	.30	.31	.45	.45
60	.455	.475	.67	.65
80	.61	.63	.92	.87
100	.77	.80	1.17	1.10
120	.915	.96	1.41	1.35
140	1.075	1.13	1.69	1.57
160	1.235	1.29	1.91	1.77
180	1.40	1.46	2.15	2.00
200	1.57	1.64	2.43	2.25
220	1.73	1.81	2.71	2.52
240	1.89	1.98	2.97	2.74

Cost of Fuel

Fuel is a most important consideration in steam cost. While fuel used to provide energy for steam generation used to be whatever material was most easily available, modern practice involves careful consideration of both price and efficiency in use. Wood waste is still burned in large quantities although current wood waste utilization developments are diverting increasingly large amounts of this fuel into more profitable applications.

A survey conducted during 1953 showed that coal remains the dominant steam-plant fuel on a year-around basis, followed by oil and natural gas in that order. Improved stokers have made it possible to handle cheaper grades of coal and hogging plant wood waste has made handling to the fire bed more economical and easier. Exhaust systems and dust collectors aid in disposing of waste and by-products by burning. Some of the more modern burners often provide for all the basic fuels.

The three big elements of steam cost are fuel, labor and maintenance. Fuel costs have increased about 50% in the last 10 years and maintenance costs have almost doubled. Wage increases have been substantial. These factors have made such improvements as automatic controls, fuel and ash handling equipment and other labor savings devices attractive investments.

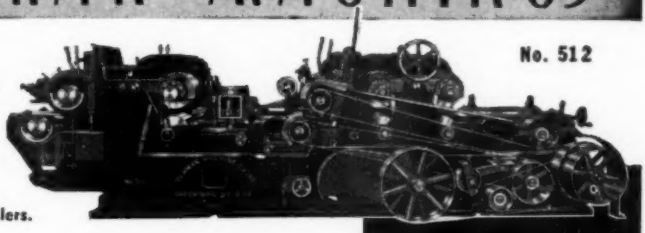
Furnaces are being designed to work with load conditions and are being provided with the best aids for combustion available. Feedwater is conditioned and treated, feedwater regulators are provided, and Co, feedwater flow, temperature, steam-flow and temperature, flue-gas temperature and draft are measured. Accurate records are kept of fuel, in and out, as well as a history of how variations in fuel grade affect handling equipment performance.

There has been considerable improvement made in furnace walls from the days of plain firebrick walls. One of the more notable was the water-cooled furnace wall. Boiler tubes filled with water protect the firebrick walls from the intense heat and each foot of wall tube produces as much steam as several feet of tube in the boiler proper.

Air preheaters have brought about a further reduction in boiler surface and economizers have proved very effective. In the plate type of preheater, for example, hot gases leaving the boiler furnace pass through certain spaces in a stack of steel sheets, while air for combustion goes through other spaces, and is heated before entering the furnace. Other features, such as built-in fans and heat recovery units will evaporate

NEWMAN MACHINES

Newman



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Speeds up to 325 feet per minute.
8" dia. cutting circle.
Six 12" dia. feed rolls.
Single and double profilers.

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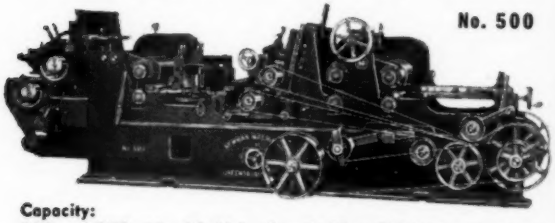

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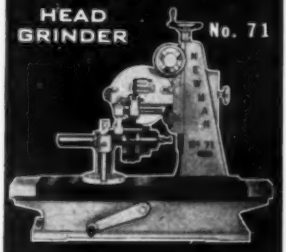
The ball bearing NEWMAN 71 (shown below) will grind all sizes of cutter heads. Table is 33" long by 9" wide with horizontal travel of 25" and is heavily ribbed to maintain accuracy over entire travel. Maximum cutter head swing is 11".

HEAD GRINDER **No. 71**



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as much as three times as much water every hour.

Condensers handle more energy per unit than older types and condensing-water pumps provide most economical operation at different loads and water temperatures. In condensate systems surge and storage plants may be sealed with steam or arranged to have aerated water return to the condenser steam space when oxygen in the feed gives trouble.

Where steam-generating equipment is used primarily for the production of power, steam-driven prime movers have been brought to new levels of efficiency and the steam does as much expansion work as possible before going to process steam for kiln drying. Mixed-pressure or low-pressure condensing units provide better plant heat balance.

When exhaust steam from turbine, engines, pumps and other equipment is used for both kiln drying and heating buildings, it cannot always be used to its best advantage. Exhaust steam is used to best efficiency when a good heat balance is maintained. This is frequently quite difficult because kiln drying and building heating demands do not always follow power demands. Where exhaust steam is used for heating buildings, a seasonal load is imposed that disturbs heat balance during the off-heating periods. This is offset in plants using large quantities of hot water somewhat by installing large hot water storage capacity.

Steam pressure requirements of dry kiln, building heating and other processes requiring steam, such as steam bending, cause several different pressures to be needed. This often results in an expansion of the steam distribution system to a point where it is so intricate and poorly adapted that losses are excessive. In modern plants these systems have been revamped to eliminate excessive pressure drops and varying pressure demands are met by the use of automatic pressure controllers.

Superheated steam is neither required nor desired for conventional kiln drying or building heating. It retards heat transfer in many types of heat exchange equipment and requires greater heat transfer surface than saturated steam at the same pressure. Where high-temperature steam is required, it is usually best supplied from a separate source and distributing system. The source may be a high-pressure boiler, or where saturated steam is used, it may be more economical to use a moderate-pressure boiler with a superheater.

A method which has been used to balance the production of exhaust steam against the requirements of low-pressure heating employs condensing equipment, and operating one or more of the generating units condensing in the summer and non-condensing in the winter. This method is usually more practical where a good natural supply of water is available but may be a bit expensive where city water has to be used for any purpose other than make-up.

Readjustment of valve setting and possibly clearance volume is usually

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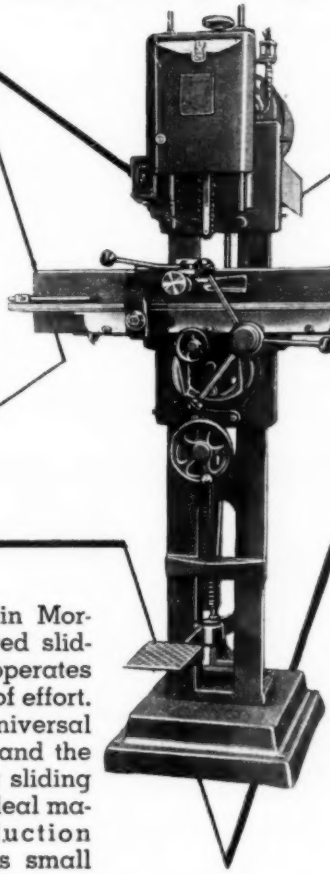

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required for running a reciprocating engine condensing in the summer and non-condensing in the winter. An exhaust-steam turbine is sometimes used to improve the heat balance of the engine-generator plant, operating on excess exhaust steam alone or may be provided with a high-pressure connection, automatically controlled, that will admit high-pressure steam when exhaust steam available is not enough to carry the load. A mixed-pressure turbine is sometimes used with a condenser for operation as an exhaust-steam turbine in the summer with excess exhaust steam and in the winter as either a straight non-condensing turbine or as a bleeder turbine, depending on the demand for low-pressure steam.

In plants where exhaust steam is available for the dry kiln, provision is usually made to supplement it by live steam, if and when necessary. The choice of distribution system for exhaust steam depends largely on the conditions. For smaller kilns, the single pipe system has been used considerably in which condensate from the steam coils is returned to the same pipes that act as risers for the steam. Although this system is very simple and has a relatively low first cost, improper drainage and interference of the condensate with steam flow often causes trouble.

Vapor Systems

Vapor systems have also been used and still are being used in many kilns which use low-pressure steam, only slightly above atmospheric pressure. These are essentially two-line pipe systems with the return lines separate from the risers. Steam enters the heating coils at the top and the condensate flows downward. Traps permit condensate and air to be drawn off without admitting steam through the return line. Air is removed from the return line, minimizing requirement of higher pressures

HARRY-
A NEW ITEM WITH PLANETOR... BUT THE SHOP SAYS THEIR MACHINE BITS ARE THE BEST!
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used in some systems.

Larger dry kiln installations frequently use the two-line vacuum return system, essentially a vapor system supplemented by a suction pump in the return line. Since steam temperature varies with its pressure, steam coil radiation output can be controlled by cutting down the steam supply and operating the vacuum pump to control pressure in the steam coils. Where exhaust steam is used, the pump serves to reduce back pressure on the prime mover.

As cited in the Forest Products Laboratory Report No. R1663, "Heat transfer in a kiln will depend upon several variables: 1) steam pressure; 2) size of feed lines; 3) size of heating coils; 4) type of coil pipes; 5) air velocity; and 6) lumber being dried."

Radiation equipment used in the kiln for heat transfer may be pipe coils, radiators and unit heaters, with pipe coils being used more generally in the form of plain and fin piping. Their size and quantity is determined by the steam pressure available in the individual kiln in order to insure proper heat control and distribution. The higher the steam pressure available, the fewer coils are required. The diameter and type of coils will affect the size of the radiation surface required to supply the amount of heat needed.

Heat requirements are also affected by the air velocity used in the kiln. The higher the air velocity (within safe limits), the more heat will be transferred from the steam coil. The faster the air is circulated, the less will be the radiation surface required to maintain the desired temperature. Kiln construction heat losses, previously discussed, also have a direct bearing on the amount of radiation required. If more than one wood species is included in the lumber to be dried, heat demand will vary with different species, faster

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Sumner Iron Works, Everett, Washington, W. Coast Rep.
Canadian Sumner Iron Works, Ltd., Vancouver, B.C., Canadian Rep.

drying species requiring a larger radiation surface than slower drying woods.

A dry kiln engineer of considerable experience recently reminisced that in his early service the price of a dry kiln was based primarily upon the amount of piping required for the individual kiln installation. To increase commissions, it was common practice to pile in all the pipe the kiln space would take. Bare pipe was always used and the use of so much pipe naturally produced over-radiated kilns which seldom provided good control. Happily, this practice soon fell into disrepute when these kilns failed to function properly. Modern kilns are designed and engineered to meet specific drying problems and while they may have a little excessive radiation, it is not sufficient to cause serious trouble.

When running steam lines for the dry kiln it is important to use only such turns as may be required to reach a certain point or to compensate for expansion. An excessive number of fittings also tends to set up friction and cause poor service. Pipe bends are required to absorb the total expansion of the pipe without developing excessive stresses in bends or anchors. Changes in direction are usually provided by 90-degree bends with long tangents which provide a means for absorbing expansion caused by service temperatures. Where the pipe line is the connecting link between two headers or in long transmission lines, it is not considered practical to change the direction of the line and expansion bends or joints are required under these conditions.

Average linear expansion and contraction of pipe which must be cared for by suitable expansion bends or joints, due to differences of temperature of steam carried and that of the surrounding air, is shown in the linear expansion of steam pipes table.

A quick rule of thumb often used to calculate pipe expansion is: The expansion for any length of pipe is calculated by taking the difference in increasing length at the minimum and maximum temperature, dividing by 100 and multiplying by the length of the pipe line under consideration.

Be sure to read "Pointed Paragraphs" for a description of the new suggestion department to appear in the next issue of WOOD WORKING DIGEST.

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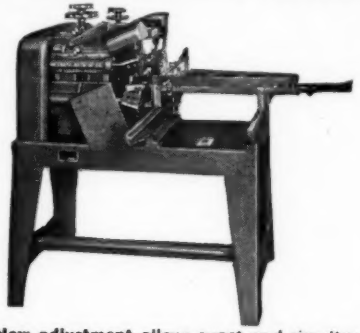

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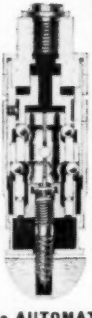

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Thermostat control.

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HARDWOODS EXHIBIT RECEIVES AWARD

Holding the plaque (center) is Ted Connelly, president of the Dean Company and member of the Hardwoods Industries committee, sponsors of the exhibit, and R. C. Van Kampen, president of Hitchcock Publishing Co. of Wheaton, publisher of Wood Working Digest. Looking on from left to right are: Burdette Green, Executive Secretary of the Walnut Association, A. R. Copeland of Copeland Lumber Co., Daniel M. MacMaster, director of the Museum of Science and Industry, George Lamb, Secretary of the Mahogany Association, Charles E. Close, Managing Director of the Hardwoods Plywood Institute, Bob Hiller of American Cyanamid Co., and L. M. Clady, Secretary Manager of the Maple Flooring Association.

A first place "award of merit" was given the Hardwood Industries exhibit at the Museum of Science and Industry, Chicago by WOOD WORKING DIGEST magazine as one of 6 awards to firms or associations initiated to recognize the work being done in better acquainting the public with the merits and values of wood.

The Hardwoods Exhibit at the museum, opened a year ago and valued at more than $200,000, presents the story of hardwoods from the biology of the tree to finished products and end uses.

The plaque presented with the award reads:

"In recognition of the assistance which this organization has given in advancing public understanding of the advantages, values and uses of wood over other materials.

"Wood plays an important part in our American heritage and tradition. May this award encourage the recipient to continue the splendid work which is hereby recognized in the furtherance of wood and wood utilization."

Short cuts that save money and time or increase general efficiency will be described in future issues of WOOD WORKING DIGEST in a column called "Around the Shop." Regular contributor rates will be paid for any shop hints published. Send in ideas you have tried out and found to work. Address the editor.

Announcing

A NEW Department

Beginning next month, August,

WOOD WORKING DIGEST

editors hope to set up a new column which will be helpful to all of our readers. We know that there are many improved techniques and methods that have been worked out in the average woodworking shop. These may be short cuts in finishing, handling material, better use of a conveyor system, homemade jigs, etc.

Would you like to see your ideas appear in our column, "Around the Shop"? Send them along to us and we shall pay regular contributor rates for all ideas accepted for publication.

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The Editor

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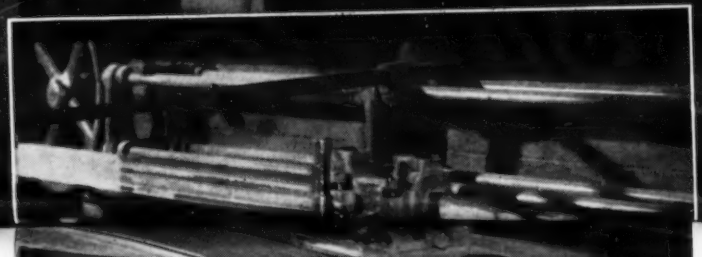

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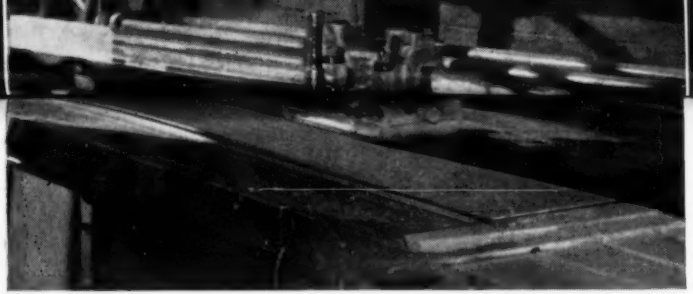

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Complete with motor platform, grooved pulleys, endless belts, wiring and starter.

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REDWOOD For... LAWN FURNITURE

By Bert Goldrath

WOOD WORKING DIGEST this month takes you on a visit to a redwood furniture fabrication shop which is typical of many in this booming segment of the industry. Appropriately enough, it is located in Redwood City, California.

Middlekauff Manufacturing Company has been a relatively small but exceedingly active producer of garden furniture for more than ten years. As many as 25 persons are employed during the peak season, which runs from January through August. They work in 6,500 square feet under roof and another 10,000 square feet under the California sky, which is usually sunny during the busy period.

Because of limited space, the chief problem is one of scheduling deliveries and shipments. The firm does not have its own "sticker," so S4S lumber with edges rounded is received almost daily from the mill in Oakland, just across the bay. The lumber is unloaded at the two radial cutoff saws on an outside platform.

Redwood is available in clear heart, select, No. 1 common (also called construction heart), sap common and No. 3 common. Middlekauff uses mostly sap common and some No. 3. Upper grades are obtained from short cuttings.

There is practically no waste in the operation. Material used is of two sizes only: dressed 2 x 4's and 2 x 6's. The 2x6's are cut into table tops of various sizes and placed on a specially devised turntable to be cut into a circle by a bandsaw. Scrap is ripped into 2x3 legs and utilized down to 6" lengths as cleats for barbecue tables or wheels.

Cleats are drilled and nailed to table tops. Assembly of parts is held to a minimum. The reason for this is that most garden furniture is sold knocked down, to be assembled by the dealers.

Bob Middlekauff, owner of the plant, says he is giving some thought to retailing the articles of furniture to be sold to the consumer as a kit. An advantage would be that the pieces could be packed in cartons and stacked to conserve space in a retail outlet. But drawbacks are that cost of assembly is really almost negligible, and that the items sell best when displayed to maximum advantage. Current practice is for the retailer to put on the legs, wheels, wheel holders and back rests (for lounges).

At Middlekauff's, the cut lumber is carried from the saws on pallets to assembly tables where cleats are nailed on. For this and most other operations inexperienced labor can be used. Items such as table tops are taken to 10 by 4 foot vats where they are dipped for

A workman is shown attaching steel straps and springs to a redwood lounge. Completed lounge frames are in the background.

staining. Legs are power-drilled and necessary hardware is wired on in a small bag. The completed articles are steel-strapped for shipment. An electric hoist is used over the packing table so that even a woman can handle the packaging operations.

Principal pieces manufactured are tables, followed by lounges. Middlekauff makes two lounges—one of 2x4's for the promotion trade, and a better lounge made of 2x6's. A line of chairs of various descriptions is also offered. Parts for the chairs and lounges are interchangeable except for the sides. A feature of the tables is a patented metal folding mechanism which enables setting up in less than a minute. Although the products are shipped knocked down, no tools are required for assembly. All chairs and lounges are equipped with rustproof steel straps and springs.

In patio furniture production, says Middlekauff, the saw man "can either make you or break you."

In addition to the previously described articles, Middlekauff also makes tables, lounges and chairs with wrought iron legs. Wrought iron has brought about a great change in the manufacture of indoor-outdoor redwood furniture by simplifying the entire operation.

Middlekauff fills in the off-season lull by turning out a line of bar stools and dinette sets with wrought iron legs and mahogany tops. Always on the lookout for new products, he is currently experimenting with a wood and wrought iron telephone desk-chair set.

To help market his products he has sales representation in San Francisco, Los Angeles and Seattle. Tentative orders for the coming season are on hand for four carloads to the Middle West and two carloads to be sent by boat to Alabama. According to Bob

Owner Bob Middlekauff demonstrates how redwood table tops are cut by a bandsaw on a custom-made turntable.

Middlekauff, redwood furniture is enjoying its greatest acceptance in the eastern half of the country, although his own market is principally in the far west.

Regarding the actual manufacture of his products, Middlekauff says: "The heart of the whole operation is at the saws. The saw men can either make or break you, depending on how efficiently they can cut with the least waste. The rest of your labor can be unskilled but you must have a saw man who knows his job."

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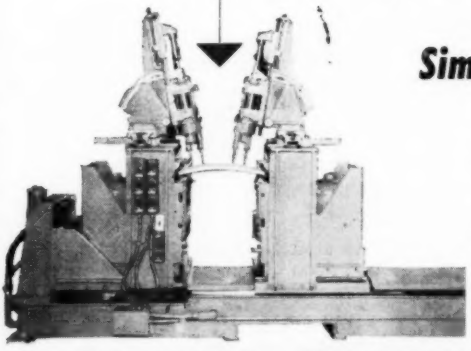

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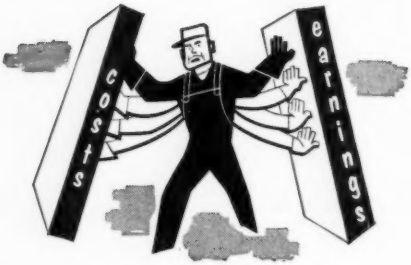

"Roughy" is a fighter with a knock-out punch for costs. "Roughy" is a wrestler who constantly wrestles that squeeze between costs and earnings.

"Roughy" is the nickname for Porter-Method-Rough-Mill-Systems, a nickname used by rough mill operators who know what he can do for them.

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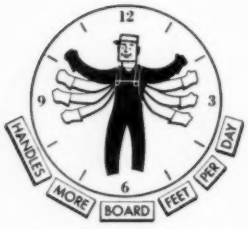

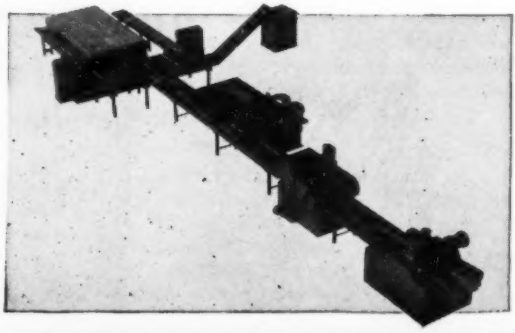

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Furniture Manufacturing

A CRAFT WITH TRADITION

Part 4

By H. H. Connelly

THE methods employed by the furniture industry to laminate plies of veneer for furniture panels can be divided into two broad classes: (1) cold press method and (2) hot press method. The hot press method can be further subdivided into high frequency and steam heated press.

There are few jobs of laminating which cannot be solved by either method. Like barking a log—there's logs that seem to peel better one temperature and some another.

For example, while visiting a furniture factory recently it was noted drawer bottoms were being laminated in a cold press while a hot press was being employed to laminate dresser tops, head boards, ends and backs for chests.

Why do one on the cold press and the other on the hot press? Their answer seems logical. For them, three-ply drawer bottoms laid by the cold press method came out flatter and stayed flatter than when done on the hot press.

In another factory serpentine drawer fronts were being glued by the cold press method. Across the street his competitor was laminating serpentine drawer fronts with the high frequency machine.

When the results of the above mentioned methods are analyzed we generally reach the conclusion that either method produces results that are satisfactory to both.

Nevertheless, if analyzed from a cost angle, we find that definite savings can be realized by one method over the other. Is your method the cheapest?

What Price Gluing?

How important is storage space to you? If you have an abundance of factory floor space, then the cold press method of gluing is no problem.

On the other hand, are you passing up the production of a line of furniture because the board of directors can't see the wisdom of adding 50,000 feet of additional factory floor area at this time?

One manufacturer found that by converting from cold press gluing to hot plate gluing he gained the use of one entire room 50 x 100 feet; like finding a small factory. This is possible for the simple reason that gluing by the cold press method, some area for retainers, containing the pressed panels, must be stored from 8 to 24 hours. This area must be heated to maintain an even temperature above the 70's. This is to insure a consistently good glue bond during winter months when low temp-

erature is not a favorable condition for laminating with the resin glues.

Besides the costly storage area for cold bonding, there are other factors of production cost that must be considered when weighing the various laminating methods.

How about glue costs? Here we find, without exception, the most fertile field. To laminate with the cold press method, successfully and consistently, a spread of 38 to 45 pounds of mixed glue per 1,000 feet of single line is recommended. If the veneer is rough, even heavier spreads are desirable. Dry, porous wood requires a heavy spread.

On the other hand, the spread for hot press gluing can be reduced safely to 28 to 35 pounds. This represents a considerable saving in material costs.

Here's another cost element that shouldn't be overlooked. The amount of extender—soft wheat flour—used with urea formaldehyde glue can be much higher with a hot plate press and still end up with a superior bond.

Labor is another cost element to weigh when selecting a method of gluing. Normal hot plate gluing will require less men to load and unload than the cold press. Additional advantages of the hot press method are:

(1) It produces sound joints quickly and uniformly.

(2) The quality is improved and there are less rejects because of poor bonding.

(3) You will realize a decrease in glue costs because a lighter spread is used.

(4) Since the wood itself is not heated no moisture is removed from the wood. This insures a more moisture stable piece of furniture.

(5) Little storage space is required since the panels or assemblies are ready for immediate further use.

Advantages of RF Gluing

(1) Radio frequency equipped presses apply pressure by pneumatic, hydraulic or other mechanical means, by an automatic time cycle or push button control, therefore, the production is increased with less money.

(2) Thick panels, built up of dozens of plies, are easily and quickly set by RF energy. Thus you are able to manufacture a thick strong board of cheap veneer.

Overlooked by most furniture concerns, when contemplating RF gluing, is the correct size unit for performing a planned application. The speed of setting, the prime factor in planning production, depends upon the unit size.

To help you solve this problem consult an engineer from a manufacturer of RF heating units. On the other hand, here are pertinent facts that the layman should know about the limitations of RF glue curing:

(1) As the glue lines per inch of width increase, the square inches of glue that is cured by each kilowatt minute also increases. This is quite understandable because less wood area is exposed per unit of glue line. Consequently less power is lost to the wood.

"Snively, I don't go for this scare-advertising!"

The above applies more specially to edge gluing of lumber. Here the square area contained in each joint is multiplied by the number of joints to given the total area to be cured.

(2) The type of wood you expect to laminate or bond will affect the power needed. The denser the wood, the more power is absorbed and taken from the glue line. It is safe to state that more area of glue line is cured per kilowatt minute when soft woods are glued. Your power would necessarily have to be greater if you are laminating hickory, maple, dogwood, or ebony instead of poplar or basswood.

(3) The type of joint used when jointing lumber by RF heat affects the amount of power needed. Without question, the quality of the preparation of the joint, the pressure, the amount of glue all have important bearings upon the answer. It goes without saying, smooth, parallel joints permit the use of lower pressure, less glue, and logically decrease the necessity of a lower curing cycle.

Hot Plate Pressing of Furniture Panels

One of the foremost advantages of hot plate gluing over cold pressing is the time element. Hot pressed plywood is ready for the next operation within minutes after emerging from the press. However, where considerable machining is to follow, a seasoning period on sticks is advisable.

This is apparent for several reasons. For one, wood like metal goes through a slight change with the addition of heat and moisture. Consequently it adjusts itself rather slowly.

A second reason for providing a reasonable time interval between operations is to allow the moisture in the veneers to come to an adjustment. For extremely thick panels, exposed to the platen heat for a long time, the moisture is surprisingly low, especially the outer plies.

To correct this, many concerns provide a dipping tank just behind the press and as the hot plywood is removed, it is submerged in the water and then placed on sticks for drying.

A second advantage of hot plate pressing is the assurance of a 100% cure when the work leaves the glue room. This assurance is questionable in cold gluing. Such influencing factors as room temperature, veneer temperature, moisture content of veneers and room humidity influence the time interval required for cold glue bonding.

Accessories Needed for Laminating Furniture Panels

Sheet aluminum cauls serve an indispensable function in hot plate pressing where the stock is small and several sheets are required to cover the platen area. However, on large stock panels where the entire area is covered, they can be deleted.

This function is three-fold: (1) They serve as a surface upon which small panels can be stored and arranged one above the other to insure localized plate pressure when placing in the press. (2) They delay the heat penetration by their thickness and consequently provide more time for loading the press. (3) By catching the droppings of glue they prevent denting the stock from collected particles of hardened glue. By the same token, fragile light colored veneer is protected from plate staining.

Send your short-cuts to speed production and save time, or for doing a job better to the editor. All shop hints published will be paid for at regular rates.

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SECTION

STYLES in FURNITURE FINISHES

By W. E. Martin

THE most important point in the selection of a finish is, how will it make the furniture look. How will it look, that is, to the buyer. The selection of finish for appearance, for its appeal to the buyer, is of course primarily the job of the designer or the stylist. It depends on trends in design and style which change with the succeeding markets. The styling of furniture finishes has, as you know, been in a transitional state for quite sometime, getting away from some of the older fixed ideas of relationship between finish and design. The trend is for traditional designs to be finished in much lighter colors, but still using color distribution—shading and highlighting, glazing, overtoning, padding, antiquing, etc., to develop lines, contours, mouldings, special features of the design. In modern designs, on the other hand, there is a movement away from very light blonds to more subtle or mellow tints. One purpose being to permit the use of modern pieces in combination with traditionally designed pieces. In the contemporary designs, including the rustic or ranch styles, light woods and light colors are quite universally used, but with glazing, shading and highlighting to produce an informal or used look rather than the stark clean look of some modern finishes. There is naturally no one color or quality of finish which is best for all furniture, even of the same general type or design. The effort among good finish designers is not just to copy successful finishes, but to create new colors, new combinations, new values in appearance which will make the furniture stand out on the display floor and attract the buyer. It is necessary to keep in mind the particular type or class of buyer to whom we wish to appeal. Thus, for example, in designing a finish for furniture in the lower price brackets, the choice is not exactly the same as it would be for higher priced furniture intended to appeal to a somewhat more sophisticated clientele.

Throughout all finishing the tendency is to bring out all possible wood value and appearance—that is, to develop the texture, the grain, the figure of the wood. Color distribution and contrast—using techniques of shading, padding, glazing, etc.—are used to accentuate the natural figure and to add interest to plainer woods.

There is still a strong demand for high gloss and polish in both traditional and modern finishes. That, of course, introduces a greater problem in finishing because high gloss reveals every defect in the finish and in the surface underneath. We have all been looking forward to a reversal in this trend but still it does not seem to come. Among the contemporary designs, however, there is an increasing use of thin, close-to-the-wood finishes in lower sheens and even in dead flat, non-reflective sheens.

While I have emphasized the importance of appearance as the number one requirement to be kept in mind in selecting a finish, there are some other points we had better not forget. If we ignore them, they may not put us out of business, but they can certainly get us into a lot of trouble and probably put us in the red until they are corrected. We must give some careful thought for example to the durability and resistance properties of the finish. A beautiful finish may sell the furniture but it will not stay sold if there is early or serious failure, such as checking, flaking off, objectionable color change, or if too easily damaged by water or by marring. On the other hand, the most durable and indestructable finish known to the business will not sell except in a rather limited field unless at the same time it has appearance value. We must design our finish so that it will have maximum eye appeal, but at the same time at least reasonable durability.

Cost certainly cannot be ignored in the selection of a finish. Finishing cost is an important item, running—so we are advised—from just under 10% to as much as 30% of total factory costs in the production of furniture. (Cost of materials averages about 3%.) The lower figure may provide a perfectly satisfactory finish so far as protection and durability is concerned. Everything above that is usually spent for added appearance. The practical limit for this added expense is a matter each manufacturer must decide for himself and depends on the market he is aiming to reach. We have seen it demonstrated time and again that the attractive finish will outsell the ordinary finish at a moderately higher price. By careful design and selection, finishes with strong sales appeal can often be produced at very reasonable cost.

Last but certainly not least of the angles to be considered in selecting a finish is the production finishing problem. We must take into account the production facilities and talent available, whether or not they can be expected to handle the finish selected.

Producing a new Design

The planning of a new piece or group of furniture often starts with discussion between the manufacturer, the designer, and one or more important buyers. At this stage interest is centered on appearance and sales appeal. Something new, different, and better is wanted. There is a tendency to make selections without due regard for new problems which will be introduced in the production finishing and without fully considering the capacities and capabilities of the finishing department. When the finish hits production there is trouble.

To avoid this, production and technical people should be consulted at an early stage. If it is not practical to do this in the planning stage, it should be done before selections are final and certainly before commitments are made for production. In most cases sample pieces will be finished before final

selections are made. This should by all means be done under supervision of the finishing superintendent. He may call for any required assistance from the finish supplier, but before final adoption, he should be satisfied that he can go ahead with production.

The judgment of a finish at this point requires experience and careful analysis. A competent finisher will raise valid objections and warnings, but will not back away from new and better finishes just because there are difficulties to be overcome. Improvements have to be made. People can be trained in new methods and operations. The best finishing foremen are often pretty good finish designers themselves, do not wait to be prodded into something better, but often come up with their own ideas as to better finishes.

At best, some troubles and delays should be expected when putting a new finish into production. This is part of the price for improved finishes.

Application of Finish

Wood finishing has a reputation for trouble. When we consider the nature of the operation and the variables encountered, that is not too surprising.

"Testing, Peep! Peep! Peep!"

The color and appearance values required in wood finishing are produced by a series of overlying color applications, not infrequently seven or eight, using as many materials. The final effect is influenced by each operation. It is subject to a number of conditions which are widely variable and difficult to control.

The wood varies in natural color, in size and shape of pores, in surface condition and in moisture content. Variations in natural color must often be compensated in the staining operation. Differences in pore size and shape cause problems in filling which carry through into subsequent coatings. Variations in surface condition—for example, a fuzzy or fibrous surface—cause differences in the color, uniformity and clarity of staining. Except for its effect on surface smoothness, wood moisture content within reasonable limits does not of itself cause as much finishing trouble as is commonly supposed.

Finishing materials can vary. Reputable suppliers take pains to maintain uniformity in color and performance, but mistakes can happen. Colored materials, such as stains, toners, etc., can change with age or from package reaction. Viscosity or fluid consistency tends to change with many materials, especially when elevated temperature prevails during storage.

Quality of workmanship varies of course as between operators; also at times with the mood or temper of individuals.

To control the final product of a finishing operation, it must be controlled daily and hourly at every point. A good finishing superintendent takes his operations apart into the smallest individual pieces. He sees that operators

are correctly trained in the performance of each job. He figures out what are the allowable limits for each operation. He sets up some kind of control to see that work is maintained within these limits. He provides for the correction and repair, at each important stage, of pieces which do not come up to standard. If the operation is too large and complex for personal control by the finishing superintendent, group leaders or inspectors are made responsible for control at each stage.

Specifically, the following points must be watched:

(A) Wood surface conditions at the start. If rough or fuzzy due to fibre swelling, slick off with fine sandpaper before staining. Repair minor damage or cracks with wood putties, or by "burning in." If work shows gouges, chatter marks, torn fibre—check back immediately with sizing and sanding operations. The more critical the final finish requirement, the more exacting must be the control at this point. It is difficult or impossible to correct improper wood preparation with finishing materials.

(B) Watch each step of color application. Set up visible color standards for each stage. For example, after undertone staining; after filling; after shading treatments; and after overtone glazing or padding treatments. Hold the color to these standards. Correct off color pieces before going to the next operation.

(C) Watch filler padding and wiping —its timing and thoroughness. There is no filler which will do a good job when wiped too wet, or scrubbed after it is too dry. This is basic to the production of smooth finishes.

(D) Watch spraying techniques with sealers and topcoats or with any coating; the adjustment of guns, of air and fluid pressures; distance, position, lapping, triggering; and the wetness and amount of coatings. Spray for smoothness and uniformity, not just for loading.

(E) Maintain condition of spray guns, pressure controls, air filters and sanders. Air supply must be constant and clean.

(F) Maintain reasonable control of drying intervals and conditions. Watch spacing and air circulation. Make allowances for poor drying conditions, such as low temperature and high humidity. With baking equipment, maintain temperature and moisture controls as well as timing.

(G) Remove and repair all rejects when they occur. Don't save all repairs for the end of the line.

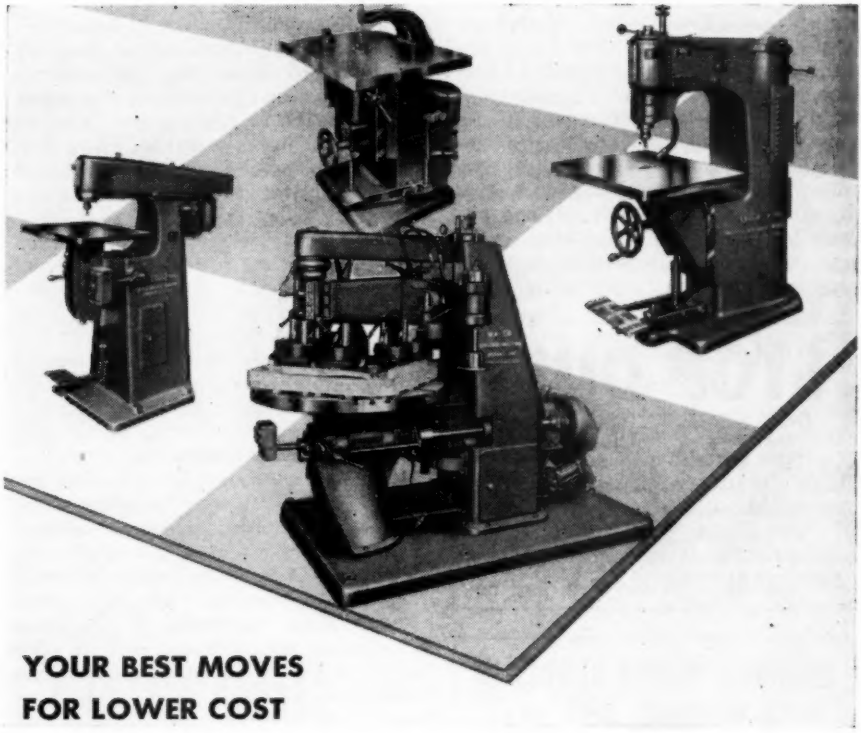
(H) In addition to all this, some inspection or testing of the finishing materials before using is very desirable. As a minimum, colored materials—stains, toners, fillers, glazes, etc.—should have a quick test for color. Fast and simple procedures for testing of all materials are available from finish suppliers.

All this takes judgment and experience. There are few gauges or other precise instruments of control, but good control pays off in smooth, steady and efficient operations.

Effect of Wood Properties on its Finishing Qualities

In finishing we are not usually concerned with some of the physical properties of wood which are important in the processing and fabricating stages. Finishing is essentially a surface treatment and it is the surface characteristics of a piece of wood which mainly effect its finishing qualities.

The porosity and absorptive nature of wood has an effect on the drying of coatings applied directly to



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the surface. Thus, it will absorb oil from a filler or pigment stain, may absorb plasticizer from a sealer. Likewise, the water absorbing property of wood and its consequent expansion and contraction obviously have a considerable bearing on finish durability.

The visible surface characteristics, which vary as between woods and between different cuts of the same wood, have an important relation to finish and appearance. It is obvious that woods selected and matched for attractive grain and figure will, if properly finished, look better than plain or unmatched woods. In finishing any wood, we try to bring out the maximum of wood value and appearance. Thus, with large pore woods we develop wood grain by using contrasting undertone stain and filler colors. We put on a thin washcoat of sealer after staining and before filling so that the filler will wipe away cleanly from the area between pores and will color the pore only, thus increasing pore contrast. On small pore woods which do not require filling—birch for example—we can still develop some pore value by using a very thin colored filler, or better still, a pigment wiping stain.

On any wood, we can develop the figure of growth ring patterns or of "flake" or of other density variations by proper selection of stain or by the technique of applying stain. Thus for example a water stain, or a non-grain raising stain containing a substantial amount of added water, will develop considerably more figure than a straight non-aqueous N.G.R. stain. This principle will produce marked difference in appearance on dense woods lacking in prominent figure, such as hard maple. We can also use it to accent the figuration of crotch and swirl patterns, including so-called manufactured swirls.

Wood Color and Figure

The natural color of wood is not an important limitation. We can start with any natural wood color and by bleaching or staining can bring it to almost any desired color. Variations in the natural color on different areas of the same piece cause a problem in uniforming. Within limits this is taken care of by techniques of staining. Serious color defects such as mineral streaks can be concealed only by using opaque pigmented stains or toners, which tend to produce a painted look.

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DETROIT "TAC" RAGS are an absolute necessity for cleaning any metal, wood or plastic surface before painting. Removes all dust, lint and sanding particles. Order today through your supplier.

STANDARD OF THE FINISHING INDUSTRY SINCE 1934

DETRO MFG. & SALES CO., INC., CULVER CITY, CALIFORNIA

A fuzzy surface condition will cause variation in the color, uniformity, and clarity produced by stains. This should be taken care of by proper sizing and sanding. Work which stands for some time after sanding and before staining, especially under conditions of high atmospheric moisture, will often need re-sanding before staining.

The size and shape of surface pores has a considerable effect on filling. Large ragged pores are difficult to fill. The only remedy is control in the padding and wiping of filler. Proper washcoating is helpful. In general, the larger the pore, the heavier should be the washcoat before filling.

Some finish effects look well over certain wood figures and poor on others. Currently popular "sea foam" finishes, done with light opaque pigment undertones followed by colored fillers, look well on flat cut figures, but generally not on plain striped figures. The smaller the wood pores, the less suited it is on this type of finish. Without definite pore value this finish looks "painted."

In setting up light finishes consideration should be given to changes which take place in the wood color with age and light exposure. Light woods: maple, birch, white oak, pine, limba, change in the amber or brown direction. Pale mahogany goes darker brown. Walnut, on the other hand, loses black and goes to the amber. Cherry sapwood goes a little to the amber, but the heartwood often goes strongly to the red. These changes show through even semi-opaque finishes and are often incorrectly blamed on the finishing material.

(To be continued)

Mr. Martin is with the Grand Rapids Varnish Corporation. He presented much of this material in a meeting with the Jamestown Area Furniture Institute, which is conducted by the State University of New York College of Forestry at Syracuse.

FAMOWOOD
...the AMAZING

ALL-PURPOSE PLASTIC for wood finishes!
. . . applies like putty — sticks like glue!

FAMOWOOD is the answer . . . where wood finishes are important. Simple to use . . . efficient, lasting, time-saving, when filling wood cracks, gouges, nail and screw holes or correcting defects. Dries quickly, does not shrink. Stays put under adverse conditions. FAMOWOOD sands easily, does not gum up sander. Takes spirit dye stains freely. Waterproof and weather-proof when properly applied. Ready to use — "right out of the can." Fifteen matching wood colors . . . with amazing matchless wood finishes.

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FAMOWOOD descriptive literature and price list on request. Distributor and Dealer inquiries invited, write Dept. 117

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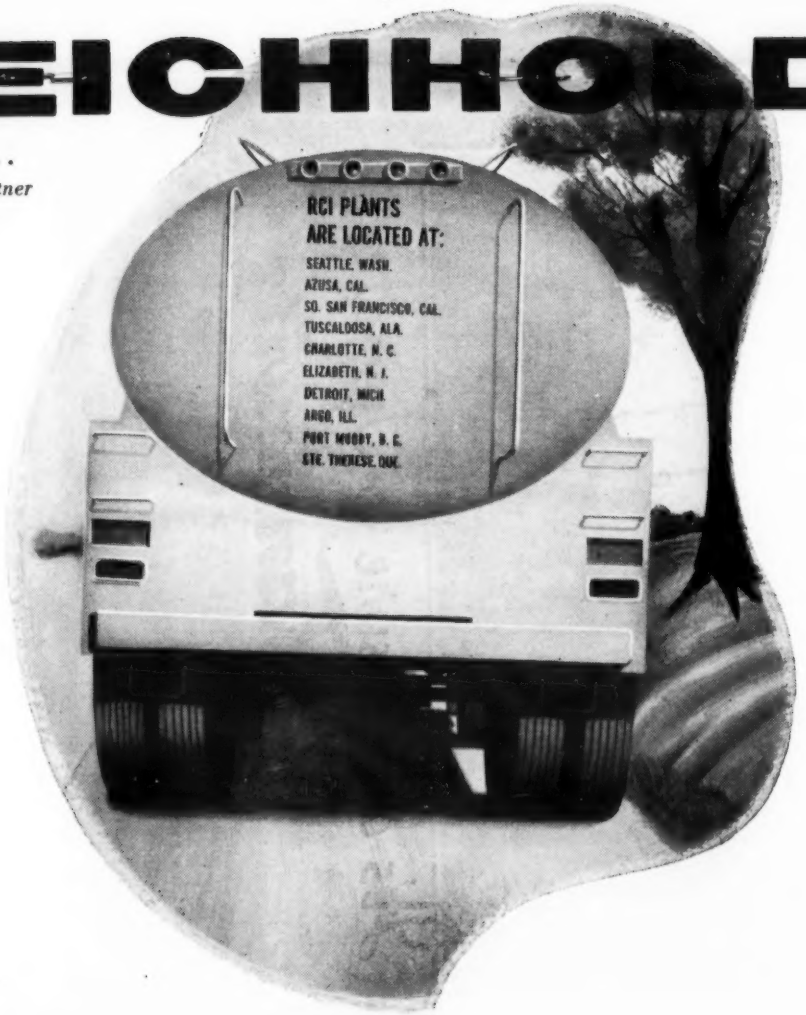
Your Partner
in Progress



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It's a Pleasure to Operate...

A Tannewitz

HIGH SPEED BAND SAW

Cuts are made so smoothly, effortlessly, even in multiples as thick as 2 feet. Geared Guide Post and other conveniences make adjustments so easy. The built-in dust syphon takes care of the dust regardless of blower system. And the machine is absolutely vibrationless. No wonder that bandsawing production vastly increases where these machines are installed. It's a pleasure to operate a Tannewitz High Speed Band Saw.

Compare Tannewitz construction. It assures a life-time of perfect service and by far the greatest ultimate return on your equipment investment. For complete details write for Bulletin GH.

SAWING MACHINERY SPECIALISTS

The TANNEWITZ WORKS GRAND RAPIDS, MICHIGAN

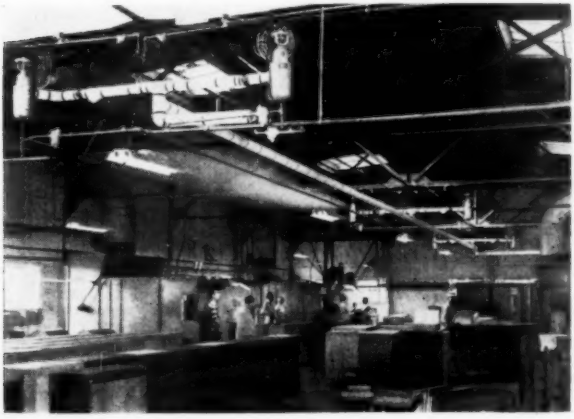
RICHMOND PLANT FINDS WAYS AND MEANS TO BOOST PROFIT

FIGHTING against increasing cost of labor and materials, David M. Lea and Company, Inc. of Richmond, Virginia, has found that, by rounding a few corners on the inside, all-important profit dollars are increased out of the more than $5,000,000 sales volume. The entire job of furniture making, from log to dresser top or bed head board, is done at their plant on the Petersburg Pike near Richmond. Farmers and loggers within a 100-mile radius bring in logs and lumber that are used as the raw material. The company saws its own lumber right from these logs and fuels its own power plant with by-product slabs and shavings. The lumber is transported from sawmill to dry kiln to assembly plant by the firm's own locomotive. Wirebound boxes are produced from the lower grade materials, and the upper grade material is fashioned into chests, beds, and other pieces of furniture.

With a constant eye toward plant economy and efficiency, John Hunziker, vice-president, authorized the Allan T. Shepherd Company of Richmond, Virginia, representatives of the Armstrong Machine Works, Three Rivers, Mich., to make a survey of their plant and offer recommendations for solving a critical dry-air problem that was resulting in costly waste of time and material.

Mr. Eaton, the engineer there who has used Armstrong traps on their dry kilns for many years, and Mr. M. Levine, their plant manager, were equally quick to recognize the advantages of using the Armstrong humidifiers proposed, and, as a result, six DAE-33 units were installed in November, 1952, in their large finishing room.

The immediate results were so beneficial that they found no need in having a man work full time on refinishing rejected units as "blushing" no longer occurred. By January, 1953, only three months later, they estimated that the units had already paid for themselves in time and material saved.



Finishing room of David M. Lea & Co., Inc. Note six Armstrong humidifiers installed in this room.

A reminder of the continuous benefits received from proper humidification occurred early in the spring of 1954 when someone inadvertantly turned cff the humidifiers overnight during a cold snap. The next morning they found 62 pieces of furniture that had to be rejected and refinished. Once the humidifiers were cut back into service, the trouble was eliminated, and they resumed what has now become their routine operation, depending on the Armstrong units to keep the proper humidity in this area.

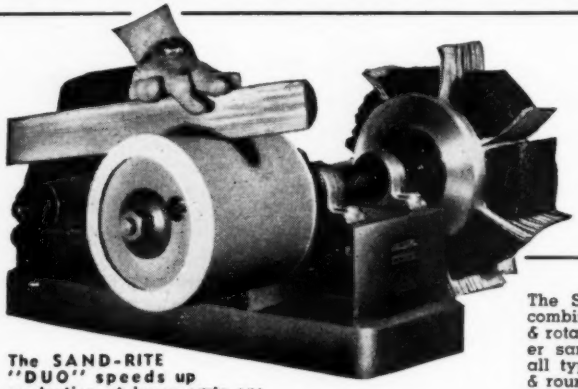
More and more modern woodworking plants are realizing the important role that controlled humidity plays in a well-balanced operation. It's no longer technical theory but practical experience, tried and tested, that has proven the need for keeping heated air with the proper moisture content. While temperature control is, as always, necessary, we now know that this furnished only part of the answer, and "temperature and humidity control" is the order of the day.

Around the Shop

This new feature begins next month. Send us any time-savers or ideas on raising production which you may have developed. The suggestions published will be paid for at our regular rates.

We are not here to get all we can out of life for ourselves, but to try to make the lives of others happier.

INCREASE SANDING PRODUCTION



USE A SAND-RITE "DUO" SANDER

The SAND-RITE "DUO" speeds up production at lower costs on:

- MOULDING
- FURNITURE TRIM
- GUN STOCKS
- CHAIR SEATS
- CHAIR LEGS & ARMS
- BRUSH HANDLES

The SAND-RITE "DUO" is a combination pneumatic drum & rotary brush sander for faster sanding & lower costs on all types of irregular shaped & rounded contour wood products. Eliminate costly hand sanding & maintain top quality finishes by using the "DUO" Sander.

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NEW SIMPLEX

Automatic Hard Edge Metal and Skip Tooth Band Saw Sharpener

Simple, yet accurate and efficient.
Precision grinding of hard edge metal and wood cutting band and circular saws and hack saws.
Vise takes band saw blades ¼" to 6" wide, circular saw blades, 4" to 18" in diameter, hack saw blades ¼" and up.
Motor driven, automatic feed.
Sealed ball bearings on main shafts and motor.

Further Details Upon Request

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LACQUER WD 8461

The merit of this fine all-around standard cold lacquer for furniture and wood products is proved not by a single special quality, but by its ability to meet every requirement for a fine wood finish.

Resists cold check, printing, chipping, marring. Perfect rubbing qualities. Excellent film body on finished article. Effects savings in costs.

For outstanding results, use Randolph WD 8461! Write us for information on your particular wood finishing requirements.

Randolph Products Co.
Dept. W Carlstadt, N. J.

1 to 8 qt. woodworkers glue pots.

The countless uses for hot woodworking glue can best be supplied from good glue melted in a

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electrically heated glue pot or tank.

The standard of the woodworking industry for more than 30 years.

Sta-Warm ELECTRIC CO.
105 N. CHESTNUT ST. ✔ RAVENNA, OHIO

Rugged Grandfather Mountain towers nearly 6000 feet near the Blue Ridge Parkway in North Carolina. It is near the home of Lineberry popular Wood Cutting Tools.

Lineberry Tungsten High Speed Steel Router Bits, Cutters and Knives are used from coast to coast. Ask for literature.

LINEBERRY
FOUNDRY & MACHINE CO.
317 Forester Ave. North Wilkesboro, N. C.

WEB MACHINERY FOUNDED

The Web Machinery Co., 620 W. 8th St., Jamestown, N.Y., has been organized to operate as the machinery sales division of the Surplus & Salvage Co., Inc. This division will specialize in the sale of all types of new and used machinery. No change will be made in personnel or management.

QUALITY CONTROL COURSE

The Division of College Extension, North Carolina State College offers the third statistical quality control short course August 16-24. Complete information is available from the division, Box 5125, Raleigh, N.C.

This is a five and one-half day's intensive training course in the methods of statistical quality control, with special emphasis on such wood processing operations as cutting veneer, veneer drying, lumber drying, gluing, finishing, sanding and grading. The course is designed for the executive or production manager who wants to become acquainted with quality control to see whether he can use it. It is also designed for the engineer or wood technologist who wishes to use these techniques.

CARBORUNDUM PROMOTION

Mr Semon H. Stupakoff, formerly president of Stupakoff Ceramic and Manufacturing Company, Latrobe, Pa., has been elected vice-president of the Carborundum Company, Niagara Falls, N.Y.

The Stupakoff Ceramic & Manufacturing Company, which manufactures ceramic and other components used in the electrical industry, was acquired by the Carborundum Company in early 1954 and was recently made a division of Carborundum. As vice-president of the Carborundum Company, Mr. Stupakoff will continue to direct the activities of the division.

FOR FAST FILLS—SOLID AS SEASONED OAK.

8 WOOD COLORS
6 SIZES

DURATITE

WOOD DOUGH

Waterproof — Weatherproof — Plastic

FIRE-RESISTANT

POLISH
SAW
SAND
STAIN, PAINT, OR LACQUER

DURATITE Surfacing Putty for *small* holes, dents, cracks and gouges. You get the same top results DURATITE Wood Dough gives in *large* fills.

Safer... Stays in. Positively will not shrink after fast initial drying.

Faster... Easy to fill even ½" cavities in one application.

Better... One user's tests proved DURATITE outperforms *90* competitive surfacers.

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WEBB PRODUCTS CO. *Manufacturers of fine surfaces and adhesives since 1923*

San Bernardino, Calif. • Norcross, Georgia. *Over 2,000 wholesale distributors in U.S. and Canada*

FLYNN IS SALES MANAGER

John J. Flynn has been appointed district sales manager of the J. A. Fay & Egan Company, woodworking machinery manufacturers of Cincinnati, Ohio. Mr. Flynn is a former sales manager and vice-president of Yates American. He will have his headquarters in Beloit, Wisconsin, and will supervise a sales area embracing, Illinois, Wisconsin, Iowa, Kansas, Montana, Nebraska, North Dakota, South Dakota and Minnesota.

Increased sales activities plus the introduction of a completely new line of woodworking machinery prompts the addition of executive personnel states Walter Schott, Jr., president.

SAFETY AWARD TO FIRTH STERLING INC.

The Award of Honor, highest safety award of the National Safety Council, has been conferred upon Firth Sterling Inc. for the year 1953. H. H. Brainerd, executive manager of the Western Penn. Safety Council, local chapter of the National Safety Council, presented the plaque to K. D. Mann, president of Firth Sterling.

Outstanding in the Firth Sterling 1953 safety record was the occurrence of only 10 loss-time accidents which were of minor nature with loss time negligible. During a period of 9 months the company completed 1,778,915 man hours with no loss-time accidents. Firth Sterling maintained a par rate for frequency of 3.0 compared with the industrial standard of 9.7, while the par rate for severity dropped to .05 compared to the industrial average of 1.20.

A.W.P.A. MEETING

The first in a series of quarterly meetings of the board of directors of the Service Bureau, American Wood Preservers' Assn., will be held in New Orleans on July 26-27, it has been announced by E. J. McGehee, board chairman.

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REES

***"Packaged"* BURNER**

Fabricated in Small Sections, Easy to Read Blueprints Supplied. No Heavy Duty Equipment Required.

FOR ALL WOODWORKING PLANTS, WHIRLWIND BURNING ACTION — LESS SMOKE, LONGER LIFE MEANS MONEY SAVED — REQUEST BULLETIN 37

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REES BURNERS LIMITED 1331 W. 6TH AVENUE, VANCOUVER, B.C., CANADA

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FACED PLYWOOD WITH

SOLID CORE

new Wonder Wood

from APMI

First it was *Sea Swirl,* decorative Douglas fir plywood . . . then Knotty *Sea Swirl* . . . now, a worthy companion to these popular APMI panels is BIRCH faced plywood.

This new product is top quality—golden beauty outside; SOLID CORE inside. Standard 4′x8′ panels are available in ¼″ and ¾″ thickness. Other sizes on special order.

APMI plywood is stocked at company warehouses and selected independent jobbers. Your inquiries are invited.

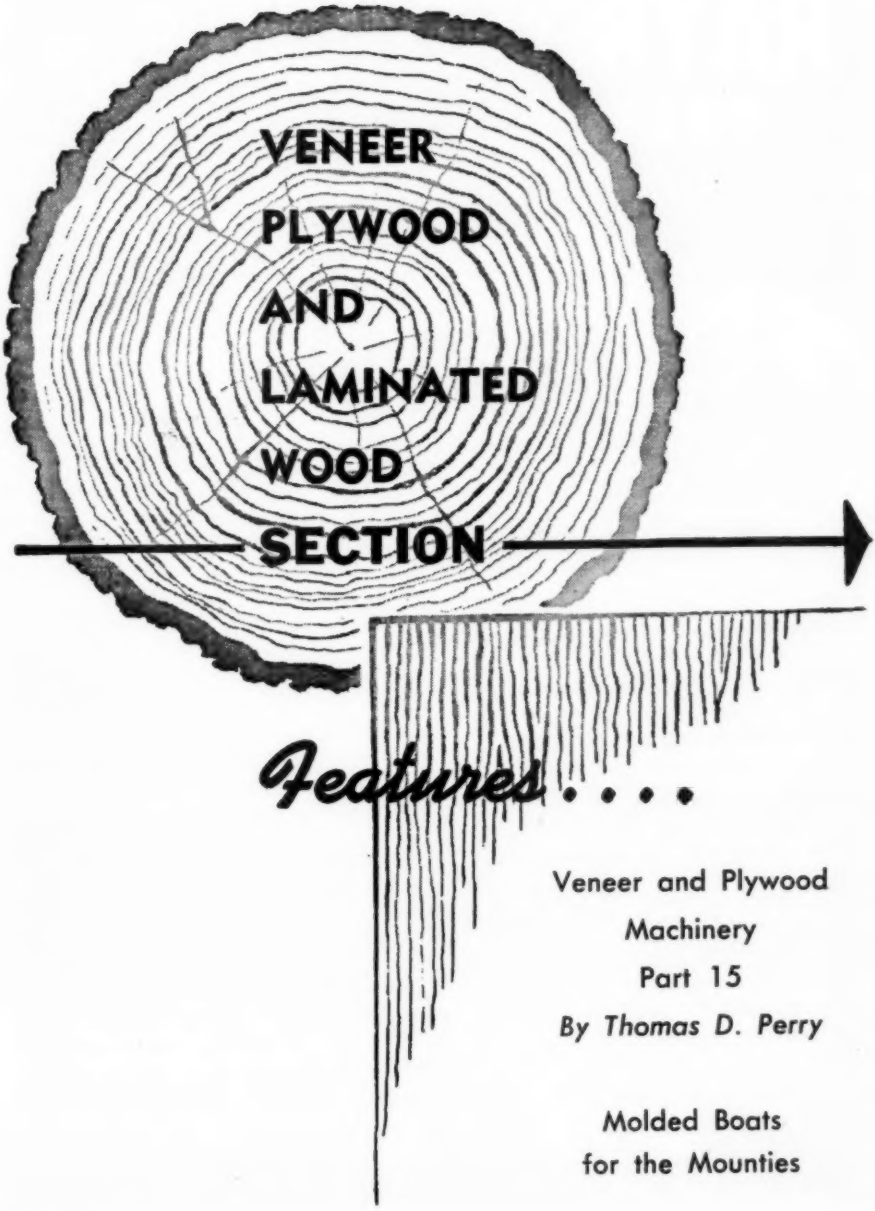
Associated Plywood Mills, Inc.

GENERAL OFFICES: EUGENE, OREGON

Plywood plants at Eugene and Willamina • Lumber mill at Roseburg

BRANCH SALES WAREHOUSES: 4268 Utah St., St. Louis, Missouri; 4814 Bengal St., Dallas, Texas; 4003 Coyle St., Houston, Texas; 1026 Jay St., Charlotte, North Carolina; Raleigh, North Carolina; Worley Road, Greenville, South Carolina; 925 Toland St., San Francisco, California; Eugene, Oregon; Willamina, Oregon.

SALES OFFICES: 31 State St., Boston, Massachusetts; 595 E. Colorado St., Pasadena, Calif.

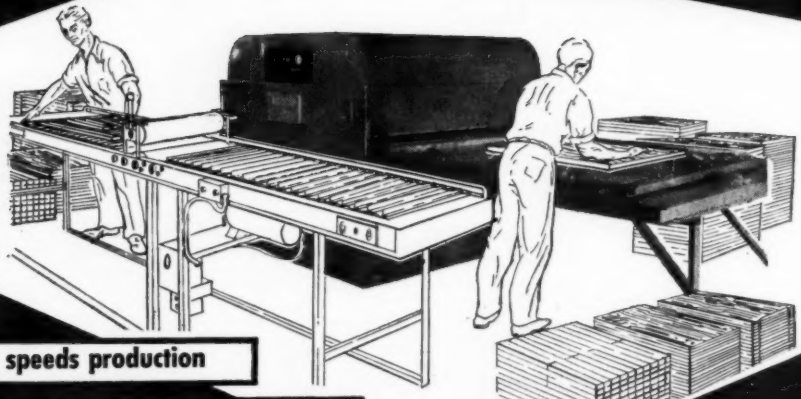


Features . . . .

Veneer and Plywood Machinery
Part 15
By Thomas D. Perry

Molded Boats for the Mounties

RAYBOND shuttle-type PANEL ON FRAME PRESS



speeds production

reduces labor costs

only two operators

wide range of sizes

reversible glue spreader

Case history shows production of more than 1000 medium size panels per 8 hour working shift with two girl operators.
Completed panels are ready for immediate use, eliminates need for storage area.
Compactness of design of installation utilizes a minimum of floor space.
Raybond processes panels of a wide range of thicknesses.
A complete Raybond installation — press, high frequency and material handling equipment — designed, manufactured, sold and serviced by one responsible source.

ELECTRONIC HEATING CORP.

66 Needham St. Newton Highlands, Mass.

MOLDED BOATS For the Mounties

By Roy C. Cooke

ONLY one firm in Canada is building boat hulls of molded plywood. This is Industrial Shipping Ltd., of Mahone Bay N.S. But for the war this type of production might not be in existence, at least in Canada.

The shortage of aluminum made plane manufacturers look for a material to take its place. The famous twin engined Mosquito bomber was one of the planes turned out with a fuselage of molded plywood.

When Industrial Shipping was organized in 1949, a wartime ship yard was acquired and specialized equipment from a Winnipeg bomber plant brought in.

Mahone Bay is 65 miles south of Halifax and only a few miles from the fishing port of Lunenburg. The area has always been famous for ship building and the skilled workmen that go with the industry. Building molded plywood speed boats was a new conception to a traditional trade that was used to following the old proved ways. A few key workers were brought in but the majority had to be trained on the job.

In 1949 the first year of operation there were about 30 employees and the goal was for 500 units. This year there are 140 employees and the target for 1954 is 15,000 units.

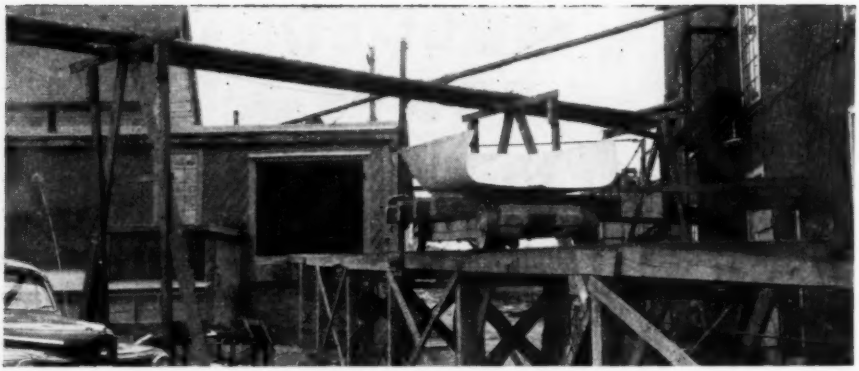
The first few years all production was confined to one large building, including the paint shop. Now production has spread to six buildings and there are three paint shops to complete the finished speed boats.

Maple and birch veneer is used mostly with mahogany on the more expensive models. The 6′ 1/16″ strips of veneer are run through a glue spreading machine and coated with a phenolic resin glue which is mixed by the firm. After drying for 48 hours at controlled temperatures, the veneer is stapled to solid wooden molds. Each is patterned after a particular boat.

The veneer is laid cross-laminated, four rows with birch, five with mahogany. The molds are then sealed in an air tight rubber bag and wheeled into a cylinder type baking oven or autoclave. There are two ovens with a total capacity of four molds.

An hour and twenty minutes later the lugs sealing the huge safe-like doors are unscrewed, the doors opened, and the molds on small trolleys are wheeled out. Their treatment at this stage is complete.

The 300 degrees of heat and 70 pounds of steam pressure form the molded plywood into the exact shape of the hull. The sealed rubber bag prevents the steam from entering between the layers



All shells go by conveyor belt to the sanding room at the top of the ramp. Then back to the main plant to be crated and shipped out, or to be finished.

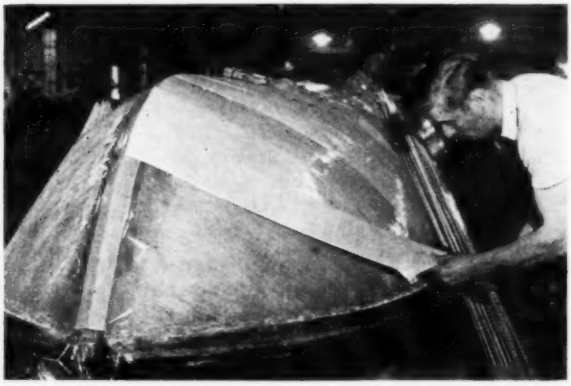
of veneer. To stand the pressure, the molds are of solid hardwood and weigh from three to seven tons.

About 70% of the production goes to the United States. This is mostly in the form of unfinished shells which are sanded after they come from the ovens. American manufacturers add hulls, splash rails, gun wales, decks, etc.

With this year's increased production Industrial Shipping is one of the World's largest producers of molded speed boat hulls, if not the biggest. This, of course, takes into account the shells or unfinished units as well as finished boats.

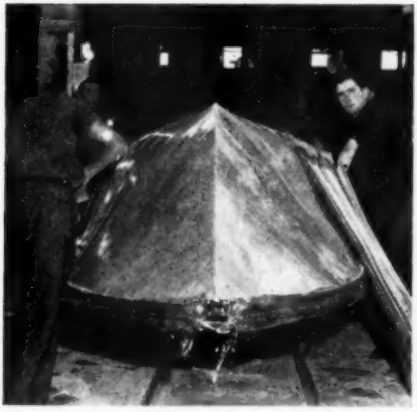
Birch plywood is used mostly and is brought in from Ontario. There are no plywood manufacturers in the maritimes. Most of the finished speed boat production is sold in Canada. Recently Canadian boat builders are discovering that it is cheaper to buy hulls from a manufacturer who is geared for mass production.

All the way through it is a quality operation and especially is this emphasized in the paint shop. Here the completed boats are finished for the buying public and must be able to stand comparison by way of eye appeal. All painting and varnishing of the hulls is

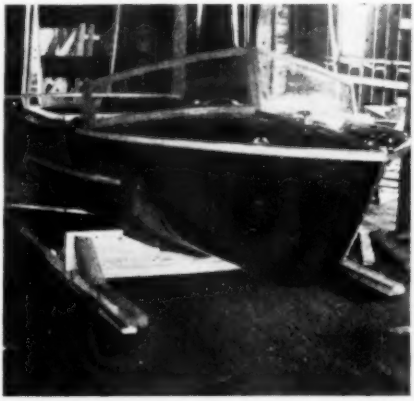


Before veneer is laid, a strip of cellophane is laid under the stem and keel so that the molded boat will not stick to the mold.

A rubber covered mold is hauled from the baking oven when the heat treatment is completed.



Cross laminated, the fourth and final layer of veneer is nearly stapled to the mold. Then it is wheeled into the oven to bake.



This speed boat is on its way to the Royal Canadian Mounted Police detachment at Aklavik, Canadian North West Territories.

Partial view of the plant shows wooden molds on the left, two ovens at the rear. At the right is the beginning of the assembly line which turns the plywood shells into finished speed boats.

done by hand.

"For furniture finishes a spray gun is fine," said Norman Robar, paint foreman, "But to get the varnish into the pores of the wood you've got to brush it in by hand. Takes longer but well worth it and we've proved the finish stays on longer in salt water too."

Inside and outside three coats are applied and each coat is hand rubbed to a fine finish. Before the first coat of varnish is applied a mahogany rubbing stain is put on.

Mahone Bay hulls have been shipped to South America, Cuba and Mexico to be completed. Speed boats have been shipped as far away as Africa.

There is a small compact repair kit available for the unlucky person who holes a hull. The repair kit works fine but fortunately is not needed too often.

Just recently a shipment of speed boats was made to an R.C.M.P. detachment at Aklavik in the North West Territories to be used by the "mounties" for summer patrol.

In their brief five year existence Industrial Shipping seems to be going places in a hurry!

All finished boats are painted by hand only. The three coats of paint and varnish are sanded for smooth finish.

MOLDED PLYWOOD

Keller Products, Inc. of Manchester, New Hampshire has available a new brochure showing many new stock forms for the manufacture of Kalwood Molded Plywood. Materials are available in a wide variety of shapes, sizes and species of wood for furniture, structural and architectural applications.

The firm also manufactures molded plywood to customer specifications. Other products include sandwich panels faced with metal, wood and plastic on cores of balsa wood or honeycomb with a third department manufacturing reinforced fiberglas plastics in flat sheets and molded shapes.

VENEER DEFECTS

The Southeastern Forest Experiment Station, Asheville, N.C., has recently issued "Defects in Hardwood Veneer Logs: Their Frequency and Importance," as Station Paper No. 39, by Dr. E. S. Harrar. It describes important external indicators of defects on sweetgum, yellow-poplar, blackgum, and water tupelo veneer logs and bolts, and relates these indicators to the defects found in the veneer produced from the logs. This well-illustrated publication can be obtained from the Southeastern Forest Experiment Station, Asheville, N.C.

CLUTCH-BRAKE DRIVE UNIT

This clutch-brake drive unit is for veneer clippers and other drive applications. The unit is described in a four-page brochure issued by the Merritt-Solem Corp., Lockport, N.Y. The unit is simple and compact in design. It can be used on any clipper and is easy to install and operate. The folder illustrates the unit and a diagram shows all working parts. Additional advantages and utilizations are given in the brochure.

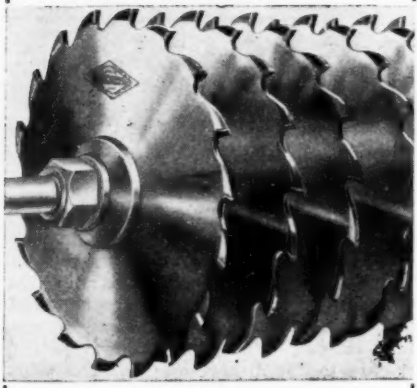
CURVED PLYWOOD for your PRODUCT

Looking for a new idea . . . something to give your product the "oomph" which puts it ahead of its competitor? And if you could have "it" with a lower unit cost, so much the better! That's where we at Larson's come in. With the Larson line of curved plywood you can add sales appeal and cut your costs over solid woods or substitute materials. Tell us about your problem . . . and we'll do our best to suggest THE idea. No obligation. Write us now.

This will give you an idea of what we are already doing with curved plywood:

Chair Backs • Chair Seats
Table Rims • Drawer Fronts
• and countless other parts for Institutional, Household and Lawn Furniture — in fact, Complex Multiple Curves of all Types

"GANG UP" ON YOUR NEXT JOB!



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GANG SAW UNITS

VICTORY Gang Rip Saws are custom built to meet the requirements of your equipment, the kind of operation and type of material being cut.

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IDEAL FOR HIGH SPEED PRODUCTION CUTTING OF OAK FLOORING, STACKED VENEER, MOULDING STRIPS, PLYWOODS, BOX CLEATS AND NARROW LATH.
Order your CARBIDE TIPPED SAWS from VICTORY, and profit by the advantages of:

- **INCREASED PRODUCTION**
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- **SMOOTHER, FASTER CUTTING**

Write today or see your dealer for full details.

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WOOD WORKING DIGEST

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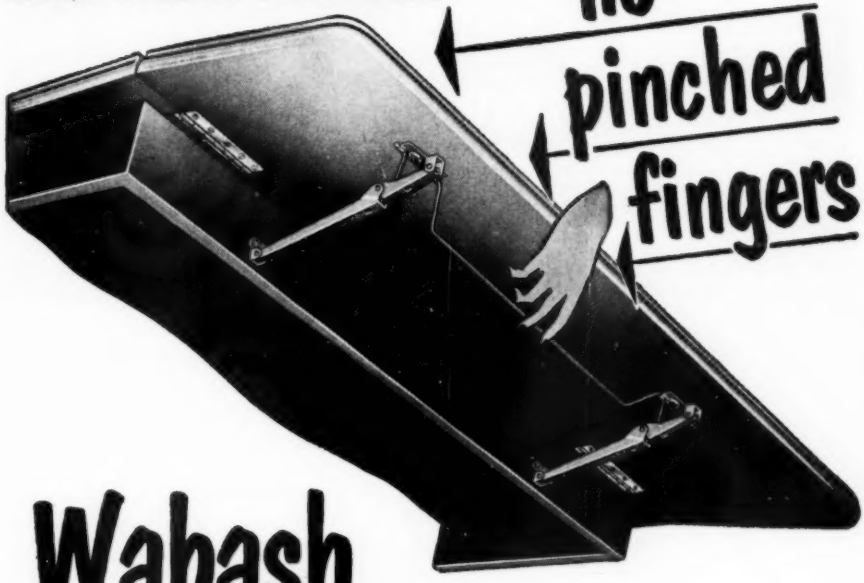

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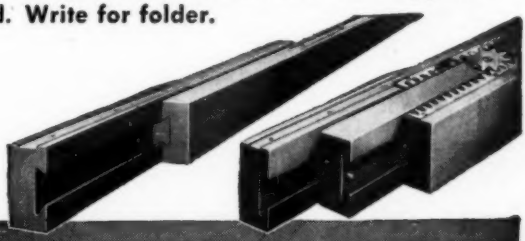

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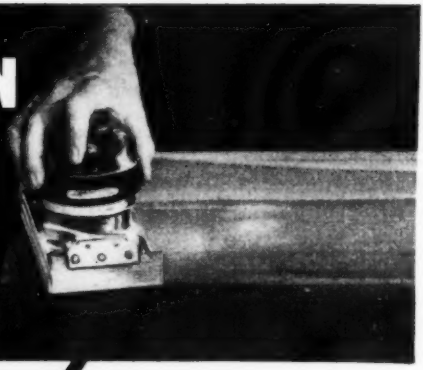

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VENEER and PLYWOOD MACHINERY

Part 15

Plywood Patching Equipment

By Thomas D. Perry

A terse statement from a West Coast plywood manufacturer, with regard to the use of patching equipment, packs a lot of meaning into a very few words: "I can now make better plywood from poorer logs."

THE phenomenal growth of the Douglas Fir Plywood Industry, since its inception at the Lewis & Clark Exposition at Portland in 1905, has been beset with many difficult technical problems. It was not until about 1925 that its product gained substantial recognition. At that time there were 12 plywood mills, with an aggregate output of around 200 million square feet of ⅜" plywood per year. In 1950 there were 62 producing units with a total annual volume of over 2½ billion square feet. This extraordinary progress is shown in the chart, Fig. 1. The black area indicates the "exterior" type, which is fully water- and weather-proof. Its manufacture was made practical by the commercial development of phenolic resin adhesives and hot presses.

In the early years there were plenty of high grade "peeler" logs, which were the top selection from the logs intended for the sawmills. The veneer from these selected logs exhibited minimum defects and produced top quality plywood. As the demand for veneer logs grew, over the years, this grade of peeler logs had to be continually revised, and always downward. As a result, in recent years, veneer is cut from logs that ought to go to the lumber mill, and the defects in the veneer have multiplied many fold.

This presented two alternatives, either clipping out full length (for 4'x8' plywood) strips which might have one or two minor defects, in approximately a straight line, or cutting out a defect to some standard shape, for which a corresponding shaped plug could be cut and inserted. In the case of the full length veneer strips, the defective parts were discarded and the salvaged veneers were edge jointed and spliced together on a tapeless splicer, as described in an article on "veneer splicers" in the September 1953 issue of WOOD WORKING DIGEST, pp. 123-34. It proved to be a time and

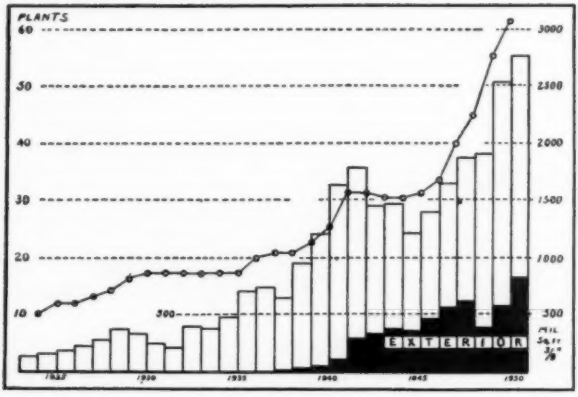

Fig. 1. Growth of the Douglas fir plywood industry.

labor consuming operation and was very wasteful. The other alternative of "plugging" out single or grouped defects proved to be economical, but resulted in a considerable range of sizes and shapes of plugs, some of which had special applications, and others were more general in their usefulness. It did not take long to demonstrate that this patching technique was a great boon in upgrading defective veneers, and in the last ten years hundreds of patching machines have been installed in Pacific Coast plywood plants. Eliminating full length strips is still the only way for long splits or extensive defects, but it is a safe guess that around 80% of the defects can be satisfactorily repaired by skillful plugging.

It should be pointed out that it is desirable, if possible, to cut out these defects and insert proper plugs in the single sheets of veneer before they are glued into plywood. However, this is not always practicable, either due to the fact that suitable equipment is not available, or to defects, like splits, which may develop during gluing. Consequently equipment for round (cookie shaped) plugs, for oblong plugs with circular ends, and for rectangular plugs with ends scarfed to a feather, has been developed to remove defects in plywood, to a fixed depth. Properly shaped plugs can then be glued into the surface of the plywood with special hot presses of limited area with wide throats to accommodate large sheets of plywood.

Another factor in the problem is that the grading rules of most softwood plywoods are tolerant of properly made plywood areas on the faces of the plywood, while hardwood grading rules limit such plugged repairs to inner layers, such as crossbands and veneer centers. Face and back layers of softwood plywood are usually 1/12" and thicker, so that defects in the inner layers seldom show through, and inside plugging is not the usual rule. In hardwood plywood, faces are normally from 1/30" to 1/20" thick, and defects in the crossbands and cores must be repaired, to present a suitable surface for finish coatings.

Consequently the techniques of plugging, in order to remove defects and upgrade the veneer, will vary according to the nature of the problem and the species involved.

Up to the present time there has been little standardization in methods of plugging and most patching equipment is likely to be either specially designed or modified to meet the needs of a locality.

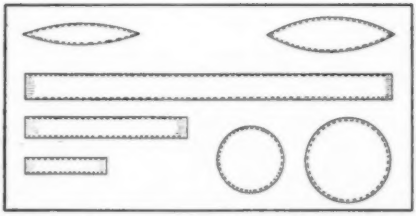

Fig. 2. Shape of patches made on Globe equipment. Upper: elliptical patches with tapered sides, 1" x 5½" and 1¾" x 6". Center: oblong, with feathered ends, widths ⅜" to 1¼"; lengths 2" to 18". Lower: circular patches, with tapered edges, 3¼" and 4¼" diameters.

Space limits this review of patching equipment to three machine makers, who are well recognized in the trade. It must therefore be considered that the shapes of plugs and the production equipment are typical examples and represent the leading and more important items in each line.

Elliptical and Rectangular Patches

The elliptical, or "boat-shaped" plug, is extensively used in the softwood plywood industry, since it provides a relatively inconspicuous patch, that fits snugly in place due to its pointed shape, and also due to its tapered sides that guide it to a firm anchorage in the veneer. The shape of this elliptical patch is shown in the upper sketch of Fig. 2. It is applicable only to single ply veneer, since the router head, which removes the defect, is lowered into and through the veneer until the hole is of the desired size and has edges of the proper taper. The plugs are cut with semi-spherical (concave) saws, mounted on shafts that tilt downward into the veneer, first one and then the other, until the tapered edges correspond to those of the hole left after the removal of the defect.

Fig. 3. Globe defect cutter, for elliptical patches.

Fig. 4. Globe patch cutter, for elliptical plugs.

The defect cutter is shown in Fig. 3, and the patch cutter is illustrated in Fig. 4, showing the strip of veneer from which the patches have been removed.

The rectangular, or "sled-shaped" patch, is especially adapted to repairing defects in plywood after it is glued, such as flush doors, lumber core plywood, etc. The edges of these rectangular patches are slightly tapered to fit snugly, and the square ends are scarfed down to a thin feather. The defect cutter is shown in Fig. 5, and consists of a travelling cutter head which makes a depression, slightly less than ⅛" deep, with sharp tapering edges and long sloping ends. After being glued in

Fig. 5. Globe defect cutter, for rectangular patches.

place the plug should protrude above the surface, enough to permit sanding it down smooth. Cutter heads are available for widths from ⅜" to 1¼", and adjustments in the defect cutter provide for lengths from 2" to 18" in 2" and 4" steps.

It is important in all patch cutting operations that the veneer be maintained at a maximum dryness, so that no further drying nor shrinking can occur, either in hot pressing or in subsequent service. This will prevent unsightly hair checks, along the edges of the patches, which might show through the finish coatings. Patches in veneer should be the exact thickness, of the adjacent veneer, and should match in color and grain character. Patches in plywood should be slightly thicker than the depth of the groove, so as to sand down even with the surrounding plywood surface.

A hot press, with limited platen area, is illustrated in Fig. 6, using pneumatic pressure and electrical heating units of the resistance type. The table on this machine has a 54" throat to the center of the heating pad, and the pneumatic unit has a vertical stroke of 2", to accommodate standard flush doors.

This company also supplies equipment for round (cookie-shaped) patches, as shown in the bottom sketch of Fig. 2. While these are usually inserted in the veneer before gluing into plywood, this technique with accurate end cutters can be applied to glued plywood.

Oblong Patches with Rounded Ends

Typical examples of this shape of patch are shown in the photo of Fig. 7. The most popular size is ¾" wide by 3" long, which is especially useful for the numerous pitch pockets that occur in softwood plywood. Other sizes range up to 2½" wide and to 18¾" long. While these oblong patches can

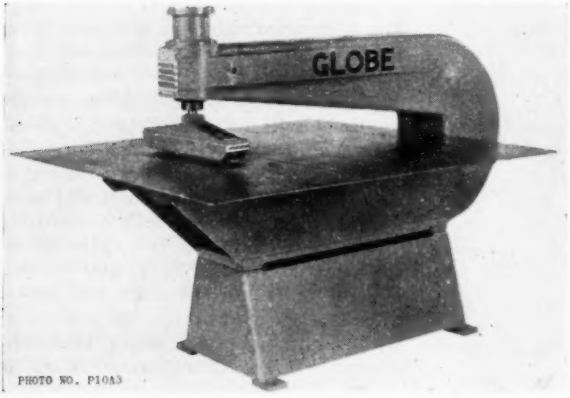

Fig. 6. Globe hot patch setter, with 4" x 24" platen.

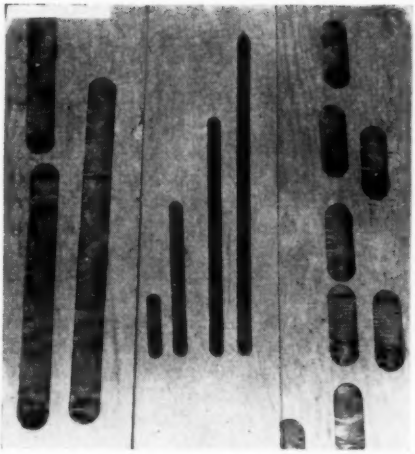

Fig. 7. Typical sizes of American oblong patches.

be inserted in the veneer before gluing, they are more frequently used for repairing and upgrading plywood after gluing. The edges of these patches are tapered in long strips of veneer, and the ends rounded as they are cut apart.

The quadrant type of defect remover for ¾"x3" standard patches is illustrated in Fig. 8. The cutter heads are tapered, so that sides and ends of the patches all have the same tapered edges.

The machine for making these standard ¾"x3" patches is shown in Fig. 9. The cutter heads at the left rotate in opposite directions, and both round the ends and taper the edges of the plugs that have been cut off by the reciprocating saw below.

The device for cutting out defects longer than 3" is also portable and is illustrated in Fig. 10. It can be adjusted to four standard lengths, the width depending on the diameter of the cutter head. Adjustable machines are provided for cutting these larger and wider plugs.

The round, or "cookie" patch is a favorite, and equipment for its pro-

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duction is provided by most makers of patching machines. One of the defect cutters is shown in Fig. 11 and is designed to remove knots, pitch pockets, etc., from single sheets of veneer, but can also be adapted for use on plywood. The corresponding patch cutter is shown in Fig.. 12, producing plugs of 4½" diameter. These round plugs are cut from strips of veneer, usually ⅛" thick, that are hopper fed and advanced automatically as each disc is cut.

These plugs, of the various shapes and sizes which have been described, are sprayed with glue and pressed into the veneer or plywood in electric-pneumatic hot press of the type shown in Fig. 13.

Equipment is also available for cutting out full length patches, as in doors

Fig. 8. American defect cutter for ¾"x3" standard patches.

or stock panels after gluing. Tapered edges are required to insure a tight fit, and the patch must be somewhat thicker than the recess to permit sanding to a smooth surface. Equipment for this operation is illustrated in Fig.

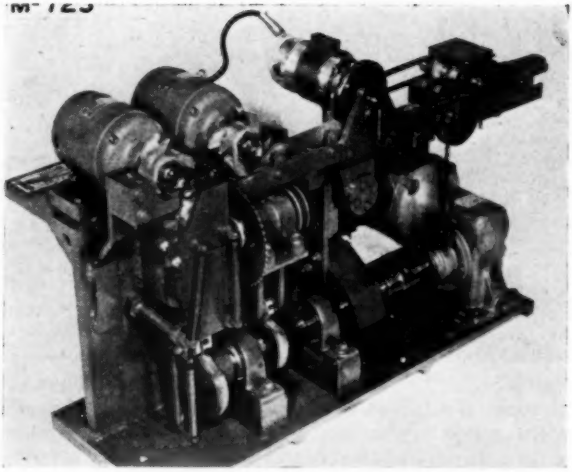

Fig. 9. American plug cutter for ¾" x 3" patches.

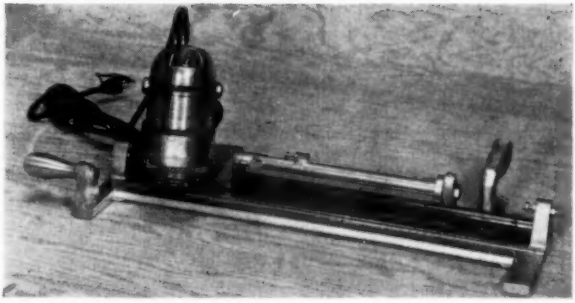

Fig. 10. American defect cutter, adjustable for sizes.

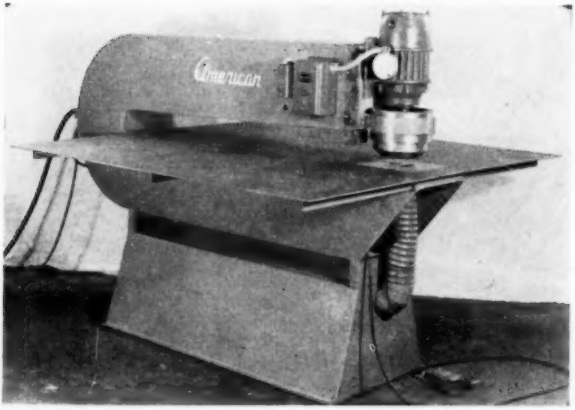

Fig. 11. American defect cutter for round patches.

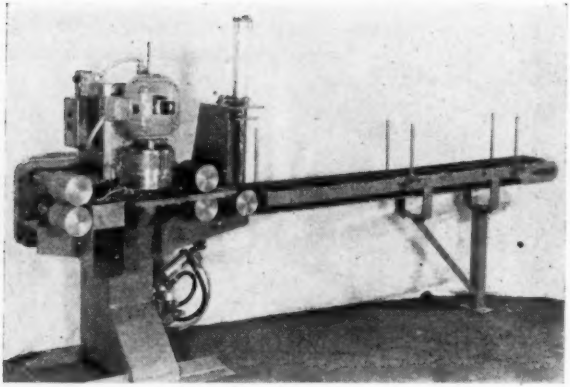

Fig. 12. American plug cutter for round patches.

14, the upper photo showing the slot cutter, and the lower indicating the hot press required to glue the strips in place.

Punched Patches

The patches, so far described, have been tapered inserts, requiring the use of rotary cutters to remove the defects and shape the plugs. While best adapted to ⅛" thick veneer, these tapered patches have been used successfully on veneer as thin as 1/20".

An entirely different technique is that of removing the defects by die punching, and also employing the same method for shaping the plugs. This permits a much broader variety in the shape of the plugs, with square edges, which are rough enough to cling, without gluing, in the veneers, after having been pressed in place. Some of the more common shapes of these veneer plugs are shown in Fig. 15, the maximum size being about 2"x4". This

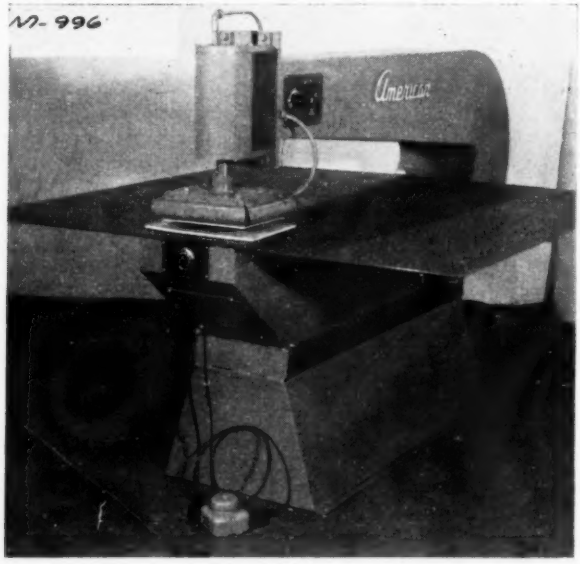

Fig. 13. American hot press for setting patches of any shape.

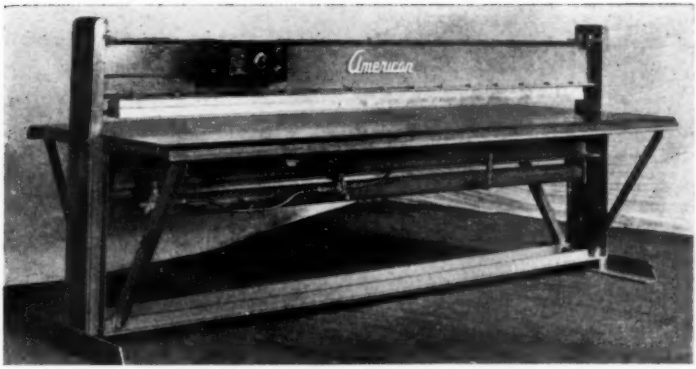

Fig. 14. American hot press setter.

equipment was devolped in Germany some years ago and has been extensively imported into the United States and Canada. It has been successfully used in softwood plywood mills for faces and backs, while in the hardwood plywood industry the method is limited to crossbands and veneer cores. It is claimed that the "dog-bone" shape (lower line in Fig. 15) can be used in splits to keep them tight and to prevent them from progressing further. Obviously square corners and pointed ends are to be avoided in this type of punched patches.

This punch method has an interesting

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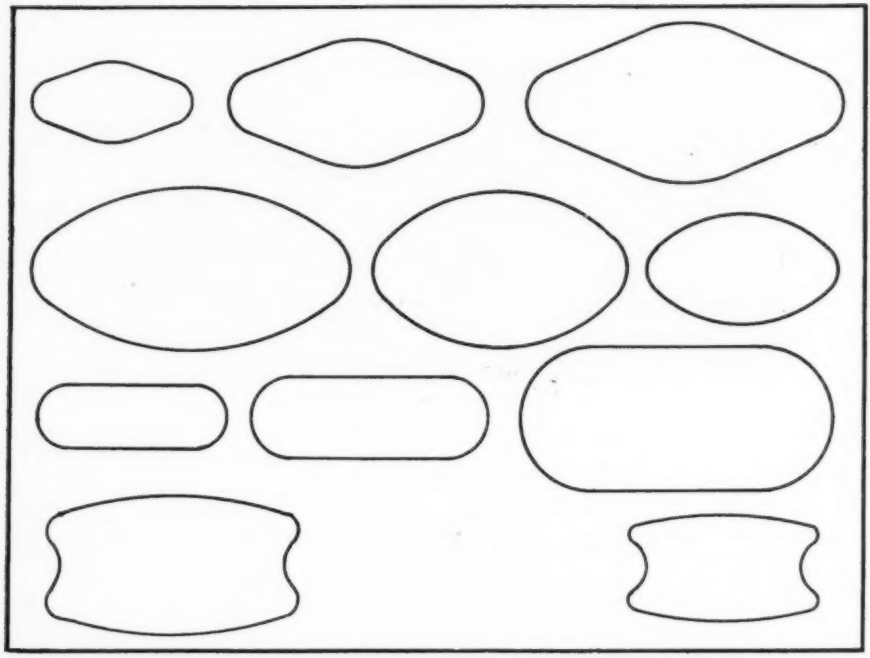
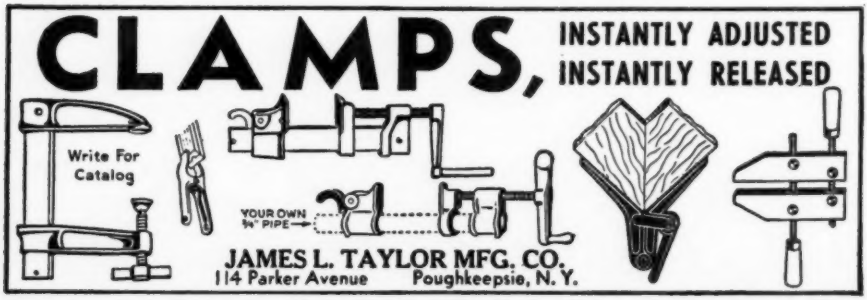


Fig. 15. Typical shapes of punched patches made on Raimann equipment.

feature, that of automatically making the patch immediately after the defect is cut out, and of pressing the patch flush in the veneer, all in one operating cycle of about two seconds. An overall view of this machine is shown in Fig. 16, with the upper punch head poised to cut out the defect as soon as the veneer is placed in position. The cycle is as follows: the defect cutting punch head drops, cuts out the defect and pushes it into a waste chute; the patch cutting head rises to cut a patch from the strip below the table, pushes the patch through the defect cutting die, and presses it flush against a plate above the veneer, which is the end of the cycle and is illustrated in Fig. 17.



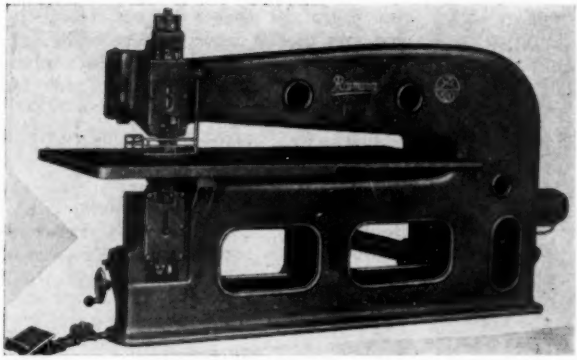


Fig. 16. Raimann defect cutter, in starting position.

There is no opportunity either for the veneer to slide or the patch to be displaced with regard to the opening in the veneer.

The patches are cut from a long narrow strip of veneer just under the table, which moves forward automatically as each patch is cut, and shows a signal light when the strip is too short for further patches.

Experience has indicated that these patches in the veneer are firm enough not to be disturbed in any ordinary handling, nor in passing through the glue spreaders. This type of equipment has been extensively used in the Douglas fir plywood industry in the Pacific Coast area, on veneer as thick as ⅛" (See Fig. 18), and in eastern Canada with hardwood veneers from 1/28" to

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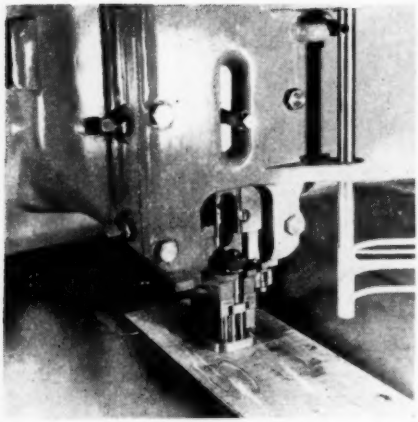

Fig. 17. Raimann punch patch cutter pushing patch into position.

⅛" thick. Obviously this method is only applicable to single ply veneer before it is glued into plywood.

Conclusions

Mechanical Patching equipment has now been thoroughly demonstrated, both in the hardwood and softwood fields. It is a proved methods of "getting better veneer from poorer logs." In other words, it will increase the net yield of usable veneer from the log, and at the same time it will allow the utilization of lower grade timber, that had been considered unfit for veneer.

Space has permitted no more than an outline of a few of the patching methods in use, and there are undoubtedly others of equal merit. Additional data can be obtained from the following companies, which have been helpful in supplying photographs and technical details for this article:

American Manufacturing Company, Inc. Tacoma, Washington.

Globe Machine Manufacturing Company, Inc., Tacoma, Wash.

Keith-Mercer Co., Ltd., 1100 Graig Str., E., Montreal, Que.

E. V. Prentice Co., 2303 No. Randolph Str., Portland, 12, Ore.

A silent face often expresses more than words.

The fame of men ought always to be estimated by the means used to acquire it.

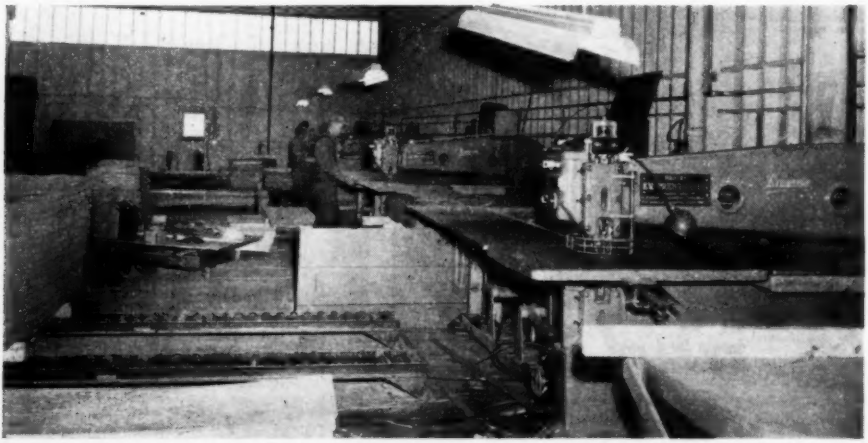

Fig. 18. Battery of four Raimann veneer patchers at a West Coast plywood mill.

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For Manufacturers, Dealers Anyone Who Works With VENEER, PLYWOOD, CUT LUMBER, BOXES, Etc.

A handy book of accurate tables for quickly determining square feet contents of veneer and the cubic contents of logs, complete to fractional units.

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Northern Hardwood Veneers, Inc.
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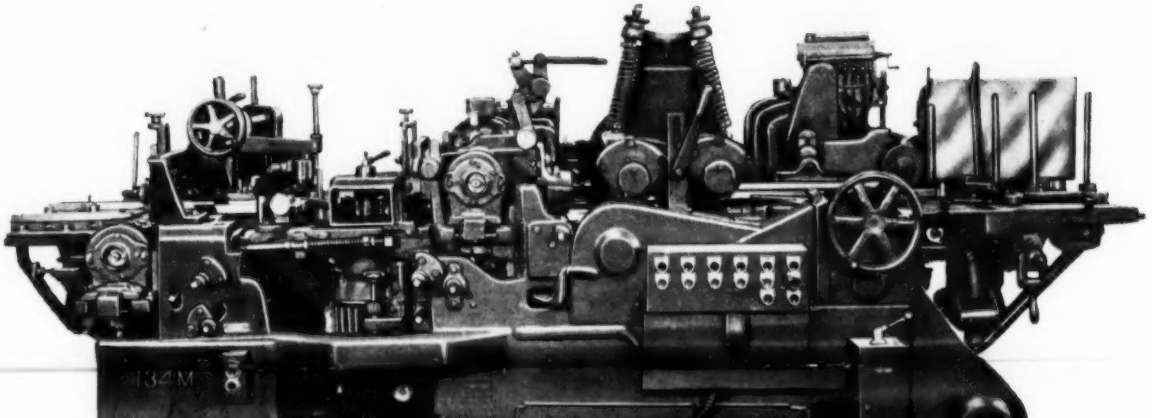
built by "The Moulder of Woods"®



134 Woods Moulder, shown with hopper feeding attachment

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A machine is no better than its design. Over one hundred years of designing know-how on wood working machines is behind the Wood's 134 Moulder. It was designed and custom built with one goal in mind—to offer you a Moulder that will "out do" and "out last" any other Moulder in its field. Space here does not permit telling you of all the exclusive features that make this 134 Moulder so outstanding. An inquiry from you will bring detailed information.

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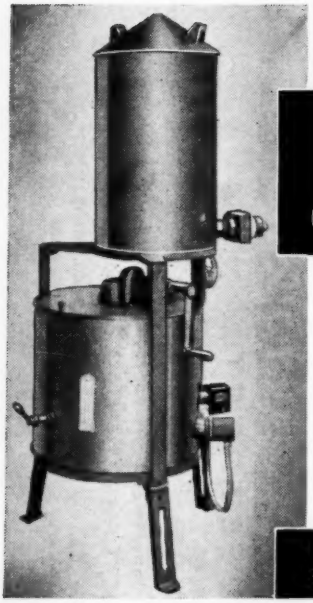
Canadian: B.C., Vancouver, Akhurst Mchy. Co. ONT., Galt, Canada Mchy. Co.

Export Dept. United States Machinery Co., 90 Broad St., New York City



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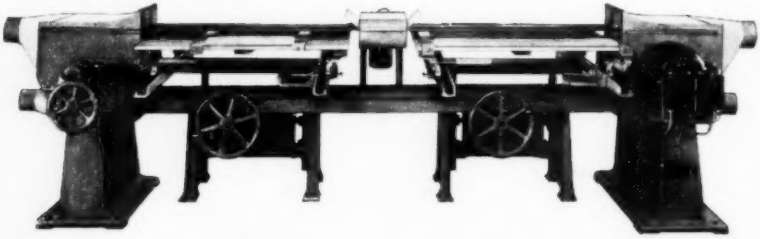
Outstanding Distinctive | **High Speed Fast Cutting** | **Quality Sanding Economy**



Designed particularly for high speed sanding of chair seats, small chair parts, radio and TV cabinet parts and other small items. With the E 2 Belt Sander, plants can double their production with a single machine! Write today and learn more about this remarkable fast sander with two tables and two belts and how other plants are cutting sanding costs and speeding production.

The above is only one of the many types of Oakley sanding machines available to the woodworking industry. Tell us your sanding problem. We may have the answer which we will give you without cost or obligation.

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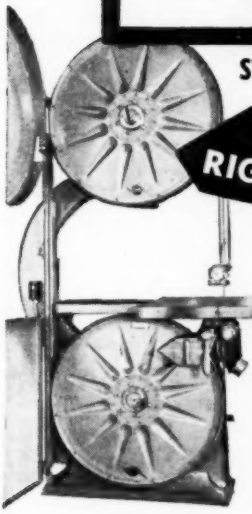

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is the use of Jiffy Tires in all sizes, from 14" to 36" as standard equipment on 14 leading band saws. Manufacturers prefer the Carter combination because:

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New Literature

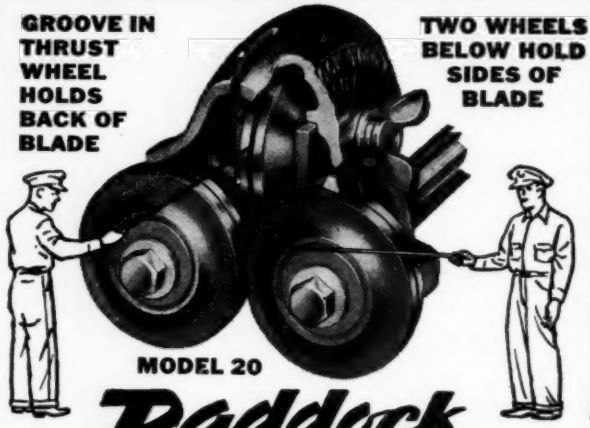
In order to continue our review (begun in the June issue) of the various brochures and catalogs distributed at the Forest Products Research Society Annual Meeting and Woodworkers' Industry Show, we are listing companies alphabetically and the literature which was available.

We regret that it is impossible to include every manufacturer's material. You may write to any of these firms for a copy of the literature described.

King Manufacturing Co., Corinth, Miss. A leaflet describing the E-Z safety feed which makes a self feed rip saw out of a variety saw. It may be adapted to mitre saw and jointer operations. The literature describes two available models—light and heavy.

Lemmon and Snoap, 286 Bridge St., N.W., Grand Rapids, Mich. Catalog No.

Sturdy, Strong, Band-Saw Guide



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A sturdy guide that lasts for years, MODEL 20 can be installed on machines having 2½" back of blade to guide post and is designed to work above or below saw table. Cut-out section of illustration shows V-shape groove of thrust wheel which supports and holds back of blade. Interchangeable ball-bearing wheels run with blade and give friction-free support to blade. Easier and better adjustment for thrust wheels for ⅛" to 1¼" wide blades. Models for large or small machines. Write for complete details. Give size, make of machine on which guide will be used.

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54 which provides a great deal of information about customized carbide tipped saws. Blades for cutoff, gang, mitre, rip, grooving and combination are illustrated and described. "Customizing" means making any designing changes necessary in order to create a saw blade to meet the customer's specifications.

Marion Machine, Foundry & Supply Co., Marion, Ind. The Marion Model M rip saw is illustrated and described in a 12-page folder. This machine is a modern straight line glue joint rip saw. Several illustrations of the machine and its working parts are included. Each part is fully described and complete specifications given.

M & E Manufacturing Co., 2573 Winthrop Ave., Indianapolis, Ind. This firm distributed a circular showing its full line for finishing. Special emphasis was given to the dry type spray booth. Floor style and bench type booths are avail-

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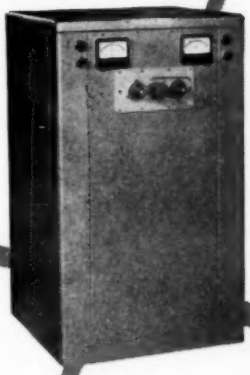
for every wood gluing application!

Whether you need a ½ KW hand gun gluer or a 50 KW custom-made unit— Reeve can supply it.



Reeve builds industrial electronic heating equipment exclusively . . . designed and constructed from start to finish for your particular application, including presses, work tables and any other accessories needed to give you the maximum possible production.

Reeve engineers will design the best unit for your particular need. Write for additional information to:

REEVE ELECTRONICS INC

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CHICAGO 6, ILL.

able. A leaflet is also available on exhaust units.

North American Products Corp., Edwardsville, Ill. The Woodsman bevel trim, Woodsman flush trim saw, Woodsman edge matcher, Woodsman helicut router bit, Woodsman pilot end router bit and the Woodsman style "KF" saw blade are all illustrated with very fine diagrams and descriptions. Specifications and various utilizations are given.

Nutting Truck and Caster Co., Faribault, Minn. This firm's catalog was a comprehensive treatment of all of this manufacturer's handling equipment—from two-wheel hand trucks to specially designed equipment. If you have a materials handling problem, it would be well to get a copy of this catalog.

Onsrud Machine Works, 3900 Palmer St., Chicago, Ill. Bulletin W-200 which describes the electric detail shaper. In addition to illustrating the shaper, electrical detail shaper cutting tools are illustrated. The machine is completely

Crescent 36 In. BAND SAW

The Band Saw is the most useful tool in the woodworking shop so why not get the best; one with all of these fine features:

- Massive Construction
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WHICH—All add up to increased production at lowered operating cost.

ALSO—Did you know that the Crescent 36 in. Band Saw even with all its quality is one of the lowest price offered on the market—

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SUBSIDIARY OF WM. K. STAMETS COMPANY—PITTSBURGH
COLUMBIANA 1, OHIO, U. S. A.

described, several views of it included, and specifications given.

Powermatic Machine Co., McMinnville, Tenn. A small folder—profusely illustrated—showed four different models of planers, a single end tenoner and the firm's chain mortiser. Also shown were the mortise chain grinder, eccentric clamp and two models of the hollow chisel mortiser. This compact, three-color folder presents a brief description of the complete line of Powermatic machines.

Process Engineering Corp., Crystal Lake, Ill. A free sample and a page long description acquainted one with graphite coated canvas used for various sanding operations. The sanding belt is said to wear longer when this material is used. Price lists for both the coated canvas and graphite coated 2-ply belting are given.

Special Equipment Corp., 26 W. Putnam Ave., Greenwich, Conn. This firm issued material on Therm-o-spray. This

make economical
bar clamps by mounting
"Pony" CLAMP FIXTURES

on ordinary black pipe.

The famous, original "PONY" Clamp fixtures that assemble quickly on regular pipe threads. Make low cost clamps of any length. Fast-operating — sure holding. "Multiple Disc Clutch" adjusts instantly up to work. Available in several styles, for ½" or ¾" pipe. See your dealer or write.

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For greatest value . . . "JORGENSEN" Style No. 120 deep throat, and Style No. 1 "Jorgensen" "C" Clamps, regular throat. Designed for greatest strength and balance. Surprisingly low priced . . . long life. "PONY" small "C" Clamps in many sizes for endless uses. Write for . . .

free catalog of Bar Clamps, Handscrews, Press Screws, etc.

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is a hot spraying unit which is of a new design. The bulletin points up the advantages of this unit and a variety of applications for it.

Spotnails, Inc., Evanston, Ill. A feature of this firm's brochure was the sample chart which showed actual sizes of spotnails or spotpins for fastening operations. The Spotnailer is a heavy duty portable nailing machine and this literature discusses its various applications and advantages.

James L. Taylor Manufacturing Co., 120 Parker Ave., Poughkeepsie, N.Y. Literature distributed from this manufacturer's booth described the Panelflo continuous edge gluer and the Taylor conveyor type glue applicator. Particular emphasis is put on the advantages of conveyors in the average woodworking plant.

Timber Engineering Co., 1319 Eighteenth St., N.W., Washington, D.C. The booklet "Colpres 10-B Glue," describes a quick setting, room temperature urea

America's Fastest SANDER

of Irregular Shapes

The New PEARSON Model "A"

Will not disfigure details of mouldings . . .

60% to 80% saving on sandcloth in sanding irregular shapes has been reported by many plants using a PEARSON MODEL A SANDER. Other cost saving features include sanding one or more stepdowns at same time, saving several costly operations; sanding of inside radii of circles and very flat tapered moulding. It is one of the fastest and most efficient sanders for irregular shapes on the market today! With the Pearson Belt attachment this model can be converted to an all-purpose sander at a small additional cost.

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Standard equipment includes 7 metal heads and 14 cushions made of the finest grade rubber. Length of cushions range from ¾ to 4 inches: outside diameters, 3¼ to 7 inches.

SAVES 60 TO 80% ON SANDCLOTH

HUNDREDS OF SATISFIED USERS of our Sanding Machines are an indication of the outstanding quality of our equipment. You too can save time and money by turning to PEARSON!

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WE MANUFACTURE BLOCK & EDGE SANDERS, SCROLL AND DRUM SANDERS

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HIGH POINT, N. C.

resin adhesive for the woodworking industry. One of the statements made in the booklet is, "Ten minutes from clamps to machining." All details about the glue are given—strength, extenders, preparation of wood and storage life. A chart shows the time-temperature relationship curve.

United Shoe Machinery Corp., 140 Federal St., Boston, Mass. This firm's automatic power tacker is described in literature as a pneumatically powered hand-held tool capable of high production. The tool is well illustrated and specifications given in tabular form.

Webb Products Co., San Bernardino, Calif. A colorful brochure describes this firm's wood dough and surfacing putty. It is available in eight wood colors. Illustrations demonstrate its many uses and the folder describes best utilizations.

Yates-American Machine Co., Beloit, Wis. A small boklet "Short Talks on

Reduce short-piece waste with this

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LOCKJOINT CUTTERHEAD

Here is a fast-cutting, non-burning, accurate head for tenoning the familiar multi-tongued lockjoints efficiently, rapidly, and to close tolerances. Made to your specifications. High speed steel circular cutters are hollow-ground. Designed for heavy machines where 5 h.p. or more is available. Normally used on the cope spindle of a double-end tenoner. Write for further details . . . or tell us your needs.

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1400 Railroad Ave., Dept. W-9 • Rockford, Ill.

Wood," contains a wealth of information on trees—some forty species are described. The back page of the booklet presents the Yates-American J-line machines.

DISSTON CATALOGS

New separately bound catalog sections designed to facilitate presentation of their major product lines, are announced by Henry Disston & Sons, Inc., Philadelphia's 114-year-old manufacturer of saws, tools, and alloy steels.

The important products from Disston's general industrial catalog 100-R9 have been broken down into four sections—woodworking products, cutter heads, metal cutting products, and files—so that distributor salesmen can pinpoint specific product interest of their customers and circularize their trade more thoroughly. The first two of these are ready now.

RUBA

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3 WING CARBIDE TIPPED SHAPER CUTTERS

at an amazingly low price!

FOR WOOD • PLASTICS • ALUMINUM

Ruba precision cutters can be used on shaper or drill press . . . for the most specialized job. They last longer, keep edges longer and save resharpening costs.

½" hole - 1¾" diameter

Available in straight and 7° angle.

Specify when ordering.

Write for complete circular of our full line of cutters of various shapes available in ½", ⅝", ¾", 1", 1¼" arbor holes.

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GLUED-UP DIMENSION IN BIRCH OR MAPLE

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DROP-BED MOLDER

The Fay & Egan all electric No. 775 drop-bed molder is described in a brochure by the J. A. Fay & Egan Co., Cincinnati 2, Ohio. Some of the advantages of this machine are described as follows: feed mechanism is powerful and positive; chipbreaker is provided with adjustable weight for pressure; bed of machine has vertical adjustment to allow running edge of work. A number of other features are given as well as points to check in evaluating a molder. The machine is illustrated in three different views and complete specifications are given on the last page of the folder.

FACTORY TRUCKS

The Globe Vise & Truck Co., 1320 Front Ave., N.W., Grand Rapids, Mich., describes eight of its truck models in a four-page brochure. Economical handling of materials is of vital importance in every woodworking plant. This manufacturer describes how various trucks will lessen handling problems. Truck construction is shown and specifications given for each model. Special size trucks, racks and boxes can be built to customer order. The last page of the brochure lists and illustrates replacement parts.

MEYCO SAWS

Meyco carbide tipped circular saws are described in a four-page brochure issued by the W. F. Meyers Co., Inc., Bedford, Ind. One of the features of this folder is the table giving saw specifications. Vibra-free dampers are featured on the saws and are said to distribute stress and strain more evenly. They also do away with rough cuts produced by vibration and eliminate noise.

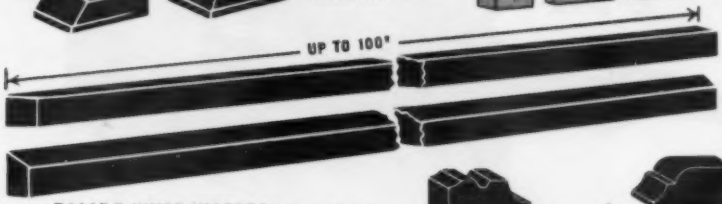
WOOD SCREWS

In addition to its standard line of wood screws ranging in size from 3/16" No. 0 to 6" No. 30, the new 12-page catalog just released by Southern Screw Company, Statesville, North Carolina,

TALIDE CIRCULAR SAW TIPS–Precision molded with clean, sharp edges—and with a special bright surface finish that facilitates brazing.

TALIDE TIPS
stay sharper · cut longer · lower costs

Available in 5 standard grades and in many sizes and shapes, for high production service on every type of woodworking operation, including the cutting of insulation board, hard board, fibres, plastics, laminated wood, etc.



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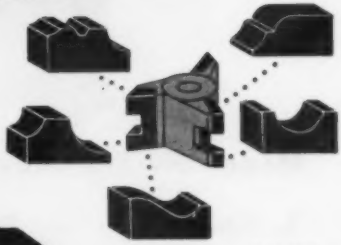

Metal Carbides Corporation, Youngstown 7, Ohio.

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HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS
OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

TALIDE ROTARY CUTTER BLANKS
Preformed to accurate tolerance with minimum stock—and to any form or shape desired.

shows also drive screws, hanger bolts, knob screws and dowel screws.

All Southern wood screws are standard in slotted and Phillips, flat, round and oval heads, and come in steel, brass, silicon bronze, aluminum, stainless steel and all popular plated finishes.

"Packing" is an important section of the catalog showing Southern's confusion-proof, soil and moisture resistant green box with identifying label; also, the loss-proof indestructible steel contained with locking lid for bulk shipments.

It is one of the most beautiful compensations of life that no man can sincerely try to help another without helping himself. —Shakespeare

---

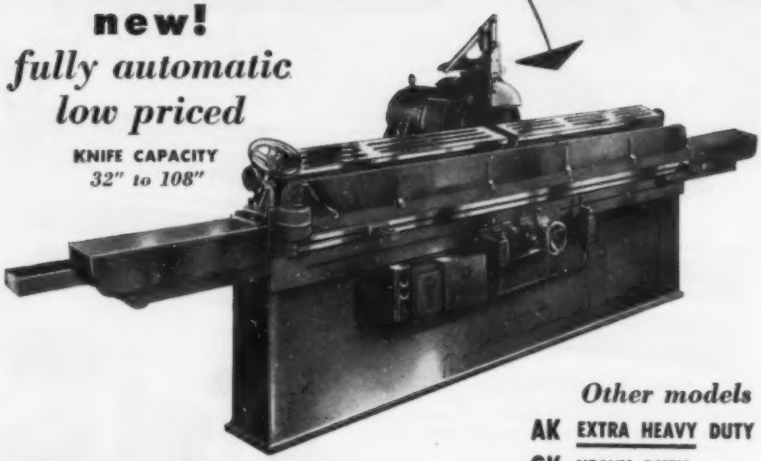
What do we live for, if it is not to make life less difficult for each other. —George Eliot

HANCHETT MODEL DN *knife grinder*

new!

fully automatic
low priced

KNIFE CAPACITY
32" to 108"



Other models
AK EXTRA HEAVY DUTY
GK HEAVY DUTY

Model DN Features:

1. Timing belt drive. Positive — quiet — non-slipping.
2. Eliminates all gears (requires no lubrication).
3. Free from vibration and reversal shock.
4. 100% Anti-Friction Bearings.
5. Precision ground ways for accuracy.
6. Guarantees perfect machine alignment.
7. Force feed lubricated ways.

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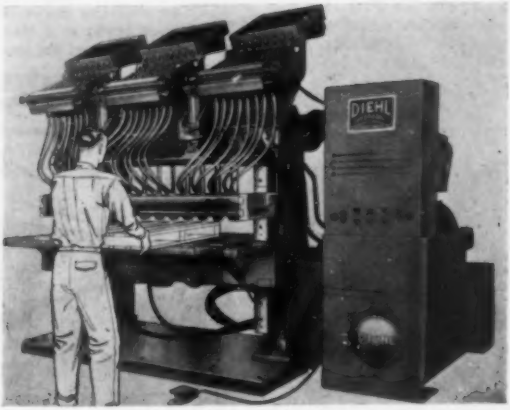
EQUIPMENT and Supplies for the WOODWORKING INDUSTRY

HYDRONIC NAILER



Design modifications of the Diehl Hydronic nailer are announced by the G. M. Diehl Machine Works, Inc., precision woodworking machine manufacturer of Wabash, Indiana.

The modifications include quick-lift hydraulic cylinders, which remove the chuck carriage from the work instantaneously upon completion of the driving stroke; simple single-point adjustment; laminated shims and adjustable bronze wear-strips on the hardened ways, designed to increase wear life of major assemblies; new disconnect switches, standard for safer operation; and massive, yet compact construction —only 100 inches from top to floor.

By combining electronic control with hydraulic power, the Hydronic minimizes setup and adjustment time, providing high-speed mass-production of boxes, pallets, skids, reels, and other items requiring automatic nailing.

Nail-picking, main table adjustment, clinching, and the nail hoppers are all controlled by push-buttons and toggle switches on the electronic master control panel. By simply flipping toggle switches the operator preselects nail combinations. Up to 10 different nailing

combinations can be provided. After nailing combination has been set, the new Hydronic switches through combination cycles automatically, with no rotary discs to change and no delicate spring mechanisms to become inoperative.

The hopper pans are individually powered, and may be stopped while the machine is in operation. This feature—another distinct timesaver in mass-production—permits the operator to change nail sizes while the machine is still running.

PLANETOR BITS

Plywood boring, in single sheets or stacks, is simplified by the development of a new "leed" point bit now available as a standard item in the Planetor machine bit line nationally distributed by Price & Rutzebeck, 22150 Meekland Ave., Hayward 50, Calif.

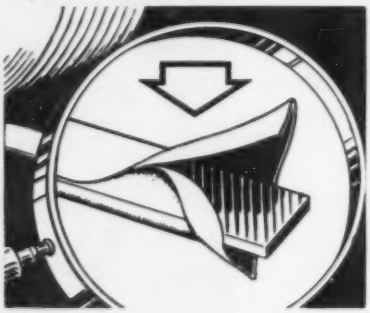
Unlike other types of bits, the cutting edges of "leed" point models approach the plywood glue lines on an

angle, cutting through them gradually. This feature is said to increase tool life between sharpenings up to 1,000%.

Sizes from 1" to 4½" by 1/16ths are stocked, with larger sizes available on special order. Illustrated literature on the simplified procedure which enables all Planetor bits to be job- or shop-sharpened is available from Price & Rutzebeck, exclusive distributor for all A. Henry Stewart Company Planetor products.

FIBER-STEEL STRAPPING

Fiber and steel strapping consists of a steel core—strong processed steel strapping sheathed in a protective cover of heavy Kraft paper with a smooth, water repellant wax finish. By a special process this cover is sealed to the core to make an integral strapping with a tensile strength comparable to the standard steel strapping and effective under all temperature and humidity conditions. It will not leave adhesive stains. The paper cover can be marked with a pencil or stamped in any way desired.

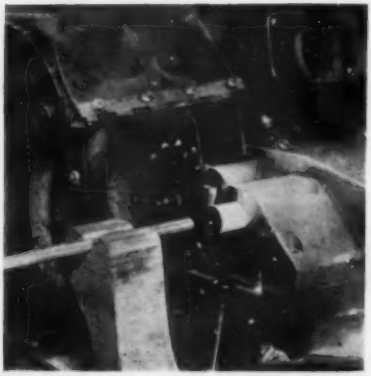


The sheathed edge of the steel band eliminates the danger of cuts to the operator.

Fiber-and-steel, available from A. J. Gerrard & Co., 1950 Hawthorne Ave., Melrose Park, N.J., is applied with regular steel binder tools. This strapping can be applied directly to cabinets or furniture without danger of marring or marking in any way.

CARBIDE THREADS WOOD

Thread milling laminated wood with carbides instead of high speed steel is saving General Electric's Switchgear



Dept. in Philadelphia more than $2400 a year, it is claimed.

A thread cutter 4" in diameter with 16 Carboloy carbide teeth is used on a lathe with Dumore attachment to turn the cutter.

The wood is laminated with a phenolic resin glue which is particularly abrasive. Because of this abrasiveness, high speed steel cutters lasted only 1/35 as long as carbides.

This application presents a second problem because a sharp point has to be held on the thread. For this reason, point wear on the tool is just as important as side wear. The annual $2400 savings is based upon the decreased maintenance costs of the carbide cutters as well as the original costs of the two types of cutters.

A ½-hp motor turns the wood. Pieces up to 1 inch in diameter are threaded. A 15-degree negative rake angle is maintained on the teeth which are Carboloy 883.

The same set-up is also used to thread mill fibre bars and comparable cost savings have been compiled.

ADJUSTABLE CLIPS

One of the best ways to make sure your tools are always in good working order is to hang them up—out of the way—yet placed where they are always in easy reach.

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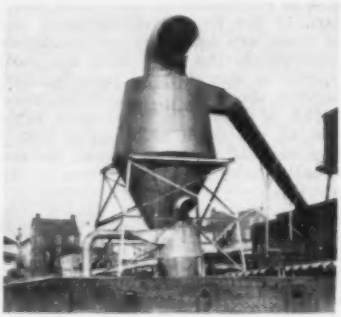
Dust cuts profits; DIXIE controls dust . . . efficiently, safely and economically. If *your* woodworking plant suffers from dust-sabotage, consult a DIXIE engineer for expert direction, at no obligation.



Large cyclone collector is part of Dixie installation at Red Lion Furniture Co., Red Lion, Pa.

DIXIE

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FREE BOOK

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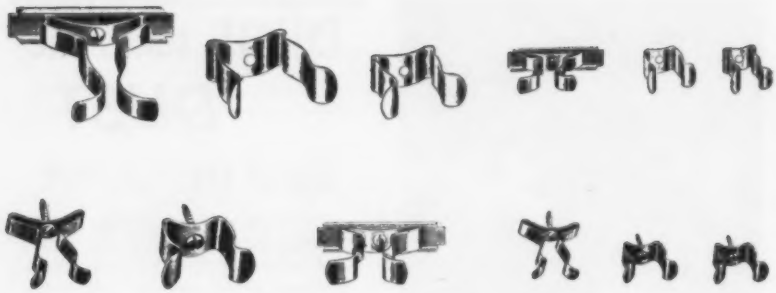


This important rule is more pertinent to woodworkers than most craftsmen, as the tools predominantly used by them are sharp pointed expensive instruments, the kind that are easily injured or damaged by poor handling. Surveys show that the average woodworker is careful about his tools, knows how to use them and knows how to take care of them. However, he continually looks for a better way to protect them.

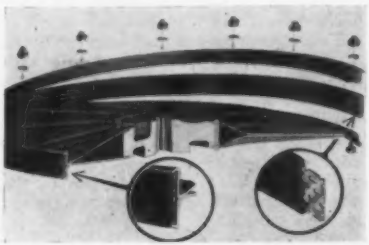
The A. I. Platt adjustable "finger grip" clip is a good accessory for the purpose. It holds anything with a handle and is made in several sizes to fit specific sized tools. Tools go in and out without effort—a gentle push "parks" them securely, exactly where wanted, a light pull releases them. They can be fastened to any woodwork and adjusted to a desired size in a jiffy. Made of tempered spring steel, they keep their shape and resiliency permanently. Just by turning the screw the clip opens or closes to accommodate the size desired, and also provides the desired tension to hold light or heavy articles.

These grips vary in size from 5/16" to ⅞" and expand proportionately in diameter. They have a multitude of uses. Included in this line of clips available from Arthur I. Platt Co., 156 Kenwood Ave., Fairfield, Conn., is a holder which combines six of these clips.

JIFFY TIRES

Carter Products Company, Inc., Grand Rapids, announces the installation of Jiffy tires as standard equipment on all Carter rigid wheels, with availability in all sizes for any band saw. This new combination supersedes the 30" and 36" size Carter quick change tire, in use since 1929, and provides the industry with greater than ever efficiency and economy in high speed, heavy-duty production. Five years in development, it is considered the most important advancement in band saw equipment during the past 25 years. The new combination of Carter rigid wheels with Jiffy tires as standard equipment was officially introduced at the annual Woodworkers' Industry Show in Grand Rapids, but is already in use by major band saw manufacturers.

Jiffy tires, in all sizes from 14" to 36", are now being used as standard equip-

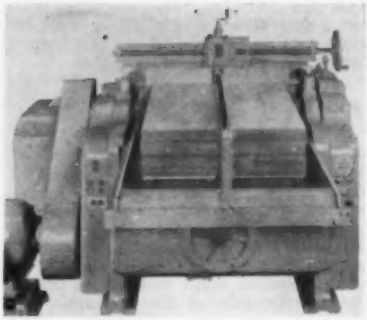


ment by fourteen leading band saw manufacturers. They are quickly and easily applied, in approximately 10 minutes, requiring no glue, cement or special tools. Jiffy tires provide 2 to 4 times more wear, and will not throw at any speed, being held on by compression and by a special locking rib which fits into a keyway in the face of the wheel.

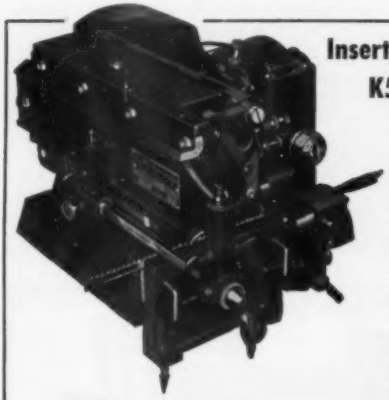
PLANE SOFT MATERIALS

The Buss Machine Works of Holland, Michigan, who specialize in the manufacture of planing equipment, have recently placed on the market a machine developed for the rapid planing of soft board used in mastic asphalt, siding, insulation board, ceiling board and other fibrous wood board products which have to be sized to a precision tolerance for exterior or beautification reasons.

This machine, it is said, basically conforms to one of their standard planers in design and construction. The material is fed into the planer by means of a double hopper conveyor with direct



chain pusher-lugs. This feeds the stock into the infeed roll from which it is carried through the machine. A "V" belt drive is incorporated in the machine and a cutterhead with six knives is turned at 5,000 r.p.m. This compares with a four-knife cutterhead running at 3,500 r.p.m. in the standard planer. The finished surface of materials thus planed is said to be very smooth and



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files, sets, joints

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Fully automatic. Does the work which formerly required two machines in—**half** the time. Saw is rigidly locked by solid steel cam when being filed and set. Operates at a speed of 60 teeth per minute. Teeth are absolutely accurate and uniform.

The Wardwell K5 insures a tremendous saving on saw maintenance. It creates keen, fast cutting teeth that **stay** sharp longer.

Let this remarkable machine save money for you as it is doing for so many others.

Write for Bulletin K-5.

WARDWELL MANUFACTURING COMPANY

3806 RIDGE ROAD CLEVELAND 9, OHIO

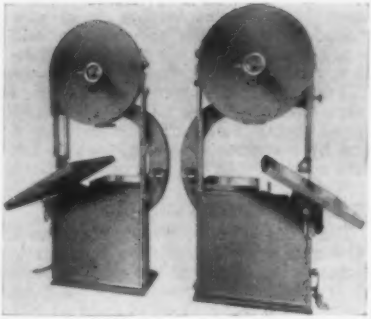
Maker of the largest line of saw and tool sharpening machines.

ideal for painting. The manufacturer states that the machine is available in widths up to 50" which permits handling of sheets as wide as 48 inches.

LEFT HAND BAND SAW

Due to an urgent demand from model and pattern shops, the Moak Machine and Tool Company of Port Huron, Michigan has just announced a left hand model of their 36" high speed band saw. The right hand model has long been a popular machine for rugged performance in high speed sawing of woods, plastics, light metals and paper. The construction of the two models is identical—with one exception. The frame of the left hand band saw is of heavy steel welded construction while the frame of the right hand model is cast semi-steel.

Both models have two wheel equalized brakes, the table location is at good work height—only 40" above the floor, and all operating controls for making every required adjustment are so located that they can be made without the operator having to change his position. Belt drive, belted motor drive or direct motor drive are optional.



LINDERMAN-JOINTED LUMBER

Narrow lumber with sound edges may be fed into the Linderman automatic wood fabricating machine made by Muskegon Machine Company, Newburgh, New York, and automatically converted from cull lumber into panels of any width up to 16 feet long.

With premium prices being commanded for larger, wider lumber, bigger trees are being cut out faster than they can grow leaving only stands of smaller timber to bolster the dwindling supply. The smaller trees yield narrower smaller lumber that sells at very low prices and is ideally suited for Linderman fabrication. One Georgia lumber manufacturer has already produced some 8,000,000 board feet on his Linderman

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Style No. 5, with loose or fixed handle
Fast acting, general purpose clamp with Hartford rapid-action tail piece for quick adjustment to work.

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machine without experiencing any difficulty.

Two test walls, constructed to meet federal property requirements, were subjected to exhaustive laboratory load tests. The test data showed the Lindermanized sheathing was equal to and, in some cases, superior in strength to one-piece 1" by 8" sheathing normally used in floor, wall and roof assemblies. The double-taper-wedge joints showed no sign of delamination after being subjected to strain tests, even though the walls were constructed from unglued stock. To insure a perfect product, all Linderman home construction stock will be glued with a water resistant glue to eliminate any possibility of delamination caused by severe condensation.

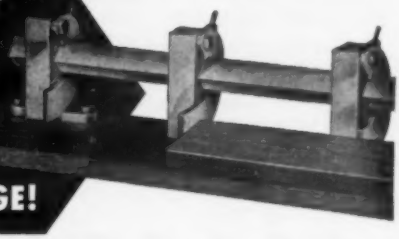
Recognition of the importance of this development is contained in a general U.S. Federal Specification issued for the use of all Federal agencies. This specification states, "Two or more pieces which are Linderman jointed and glued shall be considered one piece." The U.S. Army and the U.S. Navy have also issued their own specifications to the same effect.

Increase CUT-OFF SAW Production

WITH A

COMET

ADJUSTABLE STOP GAUGE!



COMET Stop Gauges are faster because: Stops can be positioned anywhere on the bar by hand. Additional stops can be added to the bar without dismounting it. Balanced stop trigger swings easily out of way when not in use.

COMET Stop Gauges are more accurate because: Cold rolled steel bar is engraved in ⅛" steps and can not be marred by stop clamps. Machined stop trigger is set to mark—no guess-work on rough stop castings. Work forces stop trigger against block (not away) for perfect alignment.

COMET Adjustable Stop Gauges are available in lengths from 8 to 20 ft. All parts are heavily plated against corrosion. Can be used on right or left hand installations. Price of 8 ft. bar with four stops: $34.00, F.O.B. Los Angeles.

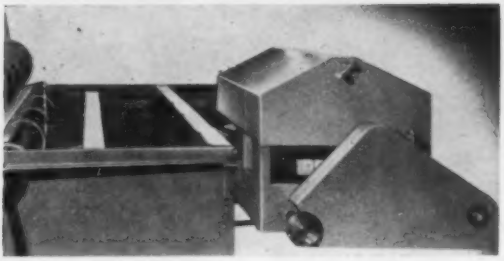
Write for complete details to Dept. H-4.

CONSOLIDATED

MACHINERY & SUPPLY CO., Ltd.

2031 Santa Fe Avenue, Los Angeles 21, Calif.

DEEP IMPRESSION END-PRINTER

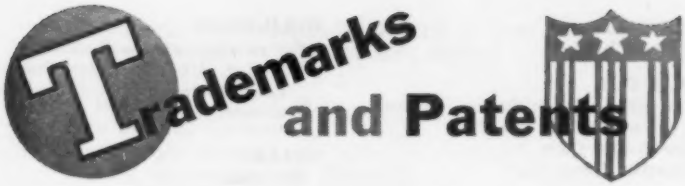


The growing urgency for greater product identification by lumber mills both for grade and trademarking has been the prime reason for the development of the Irvington No. 61 random length deep impression end-printer. The Irvington No. 61 end-printer eliminates length sorting, labor and handling, in pine and fir operations—the principal drawback to former end-printing operations. Generally installed after a smooth-end trimmer, random length lumber is automatically controlled and guided through the printing operation as the deep impression print is made as desired on either one or both ends of the smooth-end board.

In addition the end-printer has been adapted to the selective process of random length smooth-end trimming of lumber. A selection of end-printer installations depending on the requirements of the individual mill, to fit both straight random length and selective operations is provided for by Irvington Machine Works, Portland, Oregon, manufacturers of the Irvington line of smooth-end trimmers and cutoff saws.

ELECTRIC WOOD BORING SET

Now on the market is a new set of five electric wood boring bits, set No. 125A, combining revolutionary point design, a Stanley Tools (New Britain, Conn.) exclusive, with a "50-50" brad-screw point—half brad, half screw. These solid center bits are designed to put new performance and versatility within the reach of every power drill owner. Short shanks allow use in restricted areas where boring up to 3" in depth is desired. Screw portion of point leads bit into wood quickly; flat side of point enables user to withdraw bit instantly from any depth for 100% controlled drilling. Each bit is fully heat treated to hold a keen cutting edge. Five most useful sizes: 4/16", 5/16", 6/16, 7/16", and 8/16" are accurately sized to bore holes exactly as specific.



This is a reader service which we hope will continue to be helpful in avoiding infringement of trademarks and patents of others in the industry. The material has been compiled for us by James M. Heilman, director of the Legal and Patent Department, U. S. Plywood Corporation.

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For saws.
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BEHR-MANNING SPEED-WET
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Behr-Manning Corp.
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For red cedar shingles.
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DRAWING of man operating a saw chain.
For saw chain.
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GPX GREEN
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Bell Manufacturing Co.
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Inland Homes Corp.
Piqua, Ohio.

MINUTE BED-also "Trade Secrets"
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PAMUDO
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New London, Wisconsin.

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2,674,280 Hinge seat cutter.
Ralph A. Pierce.
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2,674,281 Rotary disk cutter.
R. H. Fullmer.
Williamsport, Pa.

2,674,282 Machine for cutting match splints.
Frank Schafer.
Duluth, Minn.

2,674,283 Hydraulic log barker.
F. V. Sams. Assignor to Allis Chalmers Mfg. Co.
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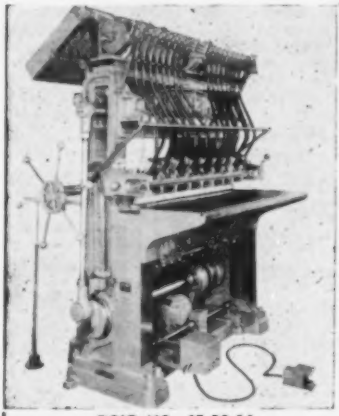
2,674,302 Convertible chair.
J. B. McMorran, Jr. and J. O. Merrill.
Cambridge, Mass.



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4. Nail feeders to give 12 separate nailing combinations.

NEW FEATURES

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2,675,717 Saw tooth forming and sharpening machine.
Stanley E. M. Standal.
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2,675,836 Adjustable gauge for cutoff saws.
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The Carborundum Co., page 130, Sample & Literature

ADHESIVES
Koppers Co., Inc., page 21, Booklet
National Adhesives, page 27, Leaflet

BITS & DRILLS
Greenlee Bros. & Co., page 83, Catalog
Lineberry Foundry & Machine Co., page 117, Literature
Alexander Dodds Co., page 166, Literature.

BOLT DRIVERS
Titan Tool Co., page 91, Literature

BORING MACHINES
B. M. Root & Co., page 61, Bulletin

CLAMPS
James L. Taylor Mfg. Co., page 140, Catalog
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C. O. Porter Machinery Co., page 100, Booklet

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DRY KILNS
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Aget-Detroit Co., page 110, Catalog
Dixie Mfg. Co., Inc., page 139, Booklet

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Blake & Johnson, page 47, Catalog

FINISHING MATERIALS & SUPPLIES
Mearl Corp., page 93, Sample.
Beverly Mfg. Co., page 111, Literature
Webb Products, page 118, Literature

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Black Bros. Co., page 4, Catalog

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Wm. H. Field Co., page 60, Circular

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Radio Receptor Co., Inc., page 48-49, Bulletin

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Black & Decker Mfg. Co., page 31, Catalog

ROOF COOLER
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Stanley Electric Tools, page 15, Manual
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SAW BLADES, SAWING MACHINES & EQUIPMENT
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Rees Blow Pipe Mfg. Co., page 119, Bulletin

SAW SETTING & SHARPENING EQUIPMENT
Foley Mfg. Co., page 58, Manual

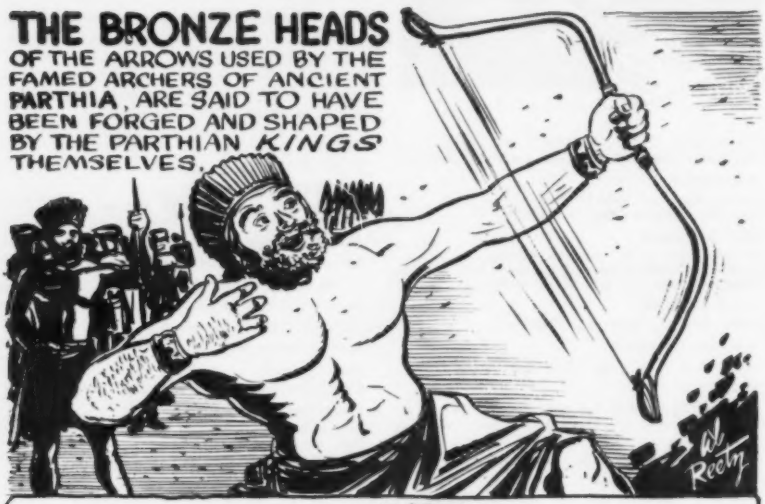
SCHOOLS
Klok Institute, page 98, Folder

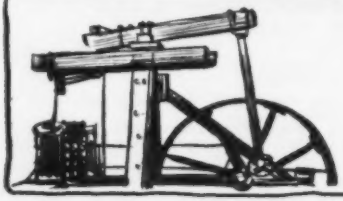
TABLE EQUIPMENT
B. Walter & Co., page 129, Folder

WEATHER STRIPPING
Central Metal Stripping Co., page 62, Bulletin.

Mechanics Through The Ages

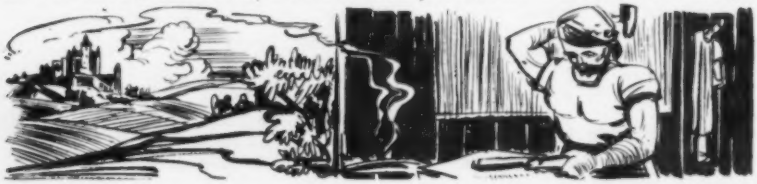
THE BRONZE HEADS OF THE ARROWS USED BY THE FAMED ARCHERS OF ANCIENT **PARTHIA**, ARE SAID TO HAVE BEEN FORGED AND SHAPED BY THE PARTHIAN *KINGS* THEMSELVES.





WATT's STEAM ENGINES OF THE LATE 1700s WERE LESS THAN 1/2000*ths* AS EFFICIENT AS THE MODERN ENGINE. THEY PRODUCED ABOUT 1 HORSE POWER FOR EVERY TON OF METAL.

MORE THAN 20,000 SMITHS PLIED THEIR TRADE WITHIN A TEN MILE RADIUS OF DUDLEY CASTLE, STAFFORDSHIRE, ENGLAND, IN THE EARLY 1620's.



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A standard tool of woodworking shops, Moak High Speed Band Saws are proving their versatility in cutting such materials as pressed and plied boards, plastic laminates, corrugated paper, ferrous and non-ferrous alloys, sheet metals and rolls of glass fibrous material. Functional design includes two-wheel equalized brakes for safety; "Lubricated for Life" bearings to cut maintenance costs. Made in 26″ and 36″ sizes, available in three drives; also made with a 4-speed transmission.

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Lists of Used and Rebuilt Machinery, either For Sale, Wanted, or For Exchange, set in uniform style, will be published in the Classified Section at the rate of $7.50 for name and address and a five line advertisement. For additional lines, only 75c per line.

DISPLAY ADVERTISEMENTS: 1 inch (Minimum), $8.50; 2 inches, $17.00; 3 inches (Maximum), $25.00.

Write directly to those offering the machine for sale, for prices and full descriptions. If what you seek is not advertised, write Hitchcock Publishing Company, 222 E. Willow Ave., Wheaton, Ill., making known your wants on either new or used machinery and the publisher will gladly assist you.

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S. W. Harrington, Inc.

P.O. Box 230 — **Asheville, N. C.**

Air Compressors, various sizes
Bandsaw, American 38", bb. v-drive
Band Saw, New Delta 20" bb. dmd.
Sand Saw, New Moak 36" bb. dmd.
Blowers, Sturtevant No. 70 & 55"
Borers, Greenlee 369-4 ft. M.D.
Borers, Greenlee No. 370 6 ft. horiz. dmd.
Borers, Moak 88 2 Spdle. horiz. dmd.
Borer, W&M No. 283B Single Spindle Vertical, dmd.
Boring & Sawing, McKnight 26F dmd.
Clippers, Coe 88" bd. & motor
Dovetailers, Dodds, 10 & 20 spindle
Frequency changers, 30 KW dmd. and 15 KW.
Glue Jointer, Diehl No. 66 bb. dmd.
Glue Jointer, Jenkins No. 343A bb. dmd.
Jointers, Glue, Yates-American No. 213 bb. dmd.
Jointer, New Moak 12", bb. dmd.
Lathe, Yates No. 74 bb. dmd.
Lathes, Mattison 55C and 57D
Lathe Heads, Mattison Hex. T-slot
Mortiser, Sidney, single spindle pb. bd.
Mortiser, Greenlee No. 228 Vert. bd. & motor
Mortiser, New Britain No. 7, bd. & motor
Mortiser, W&M No. 288—5 spdle. Horiz. dmd.
Moulder, Amer. No. 25—9" bb. dmd.
Moulders, Hermance 7" pb. bd.
Moulders, Mattison No. 222, 6" bb. dmd.
Moulders, Woods No. 107—12" pb. bd.
Moulders, Yates-American C-4—8" bb. & motor
Moulders, Yates-American C-89—6" bb. dmd.
Planer, Facing, Yates-American 36" with Jackson & Church feeder on base, bb. dmd.
Planer, Whitney 30" sgl. rd. hd., bb. dmd.
Planer, Whitney 36" sgl. rd. hd., bb. dmd
Planers, F&E—30" dbl. pb. bd. & motors
Planers, Berlin 36", rd. hd. dmd.
Planers, New Crescent 24" bb. dmd.
Planer, F&E No. 156 36x7 dmd. rd. head
Planer-Matcher, Yates A1-15"x6" rd. hds. pb. bd.
Redrier, Merritt 12 plate 36x72
Router, Defiance, 2 spindle bb. dmd.
Routers, Defiance sgl. spdle. high speed, dmd.
Sander, New Jefferson, hand block, bb. dmd.
Sanders, Mattison No. 134, pb. bd.
Sanders, Niagara brush, bb. dmd.
Sander, 48" double disc, dmd.
Sander, Smith 49" 3-drum endless bed, bd.
Sanders, F&E 60" 3 drum roll feed, dmd.
Sanders, McKnight sgl. drum 24"x16" dmd.
Sander, Oakley Model G2, bb. dmd. bd. block
Sander, Porter Cable vert. osc. dmd. sgl. spdle.
Sander, W&M No. 171 belt, bb., md.
Sander, Yates No. 431, 43" endless bed, dmd.
Saws, DeWalt, 7½ hp. radial
Saws, Hermance Gang Rip, pb. & motor
Saws, Jenkins 105A dbl. cutoff bb. dmd.
Saws, New Delta-Crescent 12" tilt, arbor, dmd.
Saws, New Multiplex, 40A & 50A
Saws, Skilsaw, 2 hp. sgl. ph. radial
Shaper, Defiance dbl. spdle., bb. dmd.
Shaper, Whitney No. 389, dbl. bb. dmd.
Shapers, New Moak single spindle, bb. dmd.
Shapers, Greenlee No. 180 dbl. bb. dmd.
Shaper, Whitney double spindle, bb., md.
Sticker, American No. 1, 1 side 4" pb. bd.
Taping machines, Dennis No. 2
Tenoners, Yates-Amer. No. 55 sgl. end, bb. dmd.
Tenon Heads, single & double end
Tenoner, Hayes 6 ft. dbl. with copes, pb. bd. & motor
Veneer Press, Francis 84x48

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Borer, Fay & Egan, Single Spindle Horizontal, BD
Borer, 6 spindle horiz., 6 ft. adj. B.D.
Borer, Williams White 8 spdl. Horiz. BD
Borer, Garden City, multiple, 6 spdl. hor.; 12 spdl. vert. BD
Borer, Andrews 7 spdl. vert. 66", BD
Borer, Andrews, 14 ft. 10 spdl. vert. BD
Borer, 5 spdl. horiz. 36" adj.
Carver, MB-3 Porter, sgl. spdl. horiz. 1 HP
Glue Spreader, Black Bros. 26", BD
Glue Spreader, Francis, 20", ½ HP
Lathe, Defiance 4', 20 HP
Mortiser, Hermance No. 10-C vert. Power chisel, MD
Mortiser, chain saw, Northfield hydraulic, 7½ HP
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Power Screw Driver, Detroit, bench type, MD
Sander, double end, Marschke, brush, 1 HP
Sander, Bed, Columbia, 3 drum, 36" oscillating, BD
Saw, Heston & Anderson, Mod. 55, cut off, VB, 5 HP
Saw, Monarch Uni Point radial, X36A cross cut, 5 HP
Saw, Badger State 36, self feed rip, VB, 10 HP
Saw, Greenlee self feed rip, 15 HP (less motor)
Saw, Circular Re-saw, Goodell Waters, 24", 20 HP
Saw, rolling top
Saw, Band, 42"
Saw, Band, 36"
Tenoner, Hayes, single end, BD

Woodward Machinery Company
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Band saw, Fay & Egan 36 in., $185
Borer, Nash, Vertical, 12 spdle, universal, $500
Borer, 3 sp. Bell automatic, hor., $250
Cutoff saw, Porter swing, BB., MD., $150
Band saw filer, Wardwell, $75
Grinder, Band resaw and braz. clamp, 8 in., $75
Lathe, Defiance 32 in. automatic, $350
Molder, Smith 8 in., 4 side, $450
Planer, Powermatic 24 in. BB, rd. head, $650
Planer, Parks, 12x4, sgl., MD., $185
Ripsaw, Yates G-2, st. line, BB., MD., $750
Ripsaw, Newman, self feed, in N.C., $250
Sander, F&E hand block belt, $185
Sticker, Colladay 1 t., 7 in., 3 side, $350
Veneer Press, Francis 4x8 ft., want offer
Sander, drum and brush dbl. pneu., $50
Saw, F&E Dbl. arbor, variety, $225
Shapers, BB, MD, Sgl. small, $75 to $125
Tenoner, Houston sgl. end, $100
Tenoner, Powers sgl. 2 copes, $200
Wood worker, Parks, 8 mchs., $350

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New Delta 3 H.P. 3 phase Radial Saws
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New 36" Delta ball bearing Band Saw D.M.D.
New Unisaws single and three phase
New Parks 12" Planer
New Millbury Bench Tenoner D.M.D.

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End Matchers: American No. 33 (pair)
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Lift Truck: Clark 3-Ton 6-cyl.
Matcher: American No. 77, 9", BD
Miter: Manco Hydraulic 30-cuts per min.
Moulder: XL Moldmatcher, 4" with extra heads
Moulder: XL Moldmatcher, 4", w/extra heads, like new
Moulder: Fay & Egan comb. BD, 25 HP motor, 10" new sq. hds.
Sander: Yates No. 431, 3-drum 30" endless bed
Saw: Eaglesfield str. line 15 HP, 5 HP feed
Saw, Band: Williamsport 24", 3 HP BD 220/440
Saw: Alden Multi-Rip 14", 25 HP, 2 HP Feed 220/440 like new
Saw: Heston Anderson Swing No. 55, 16" 3 HP, 220/440
Saws: (2) Delta 10", 1½ HP 220/440
Saws: (2) Darro James 10", 1½ HP 220/440
Saws: (2) Heston Anderson Swing No. 5, 10" 3 HP, 220/440
Scarfing Machine: Woodworkers 2 HP 220/440
Shaper: Boice Crane ¾ HP 110V, new
Surfacer: Yates No. 156 Round 4-knife 30" 15 HP 220/440

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TENONER—No. 2½ American Babbitt Bearing, belt drive

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MOLDERS—9" No. 375 Fay & Egan Babbitt Bearing
6" No. 208 Fay & Egan Ball Bearing
10" No. 50 Hermance Babbitt Bearing
10" No. 189 Fay & Egan Babbitt Bearing

SURFACERS—24"x6" No. 490 Fay & Egan Ball Bearing Single
36" No. 32D Smith Ball Bearing Single
26" Whitney Double Cylinder, Babbitt Bearing, Flexible Roll & Chipbreaker, Motor Coupled

SHAPER—No. 9 Buss Two Spindle Ball Bearing Direct Motor Drive

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42" No. 186 Fay & Egan Resaw
36" No. 950 Fay & Egan Metal Cutting with Reeves Drive

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RIP SAW—Sinker Davis Self Feed
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BELT SANDER—No. 430 Yates

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Band saw, 36" Yates-American Y-36, motor drive
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Borer, 4-ft. Bell No. 105 auto. horiz. 4 hds.
Cutter grinder, Mattison No. 231 motor dr.
Moulder, 6" Hermance No. 60 ball brg. m.d.
Planer, 30" American No. 666 Double, bb, mtr. dr.
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Saw, Bell 12-C Dbl. Miter & cut-off for caskets, m.d.

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LATHE, Mattison 57B, 42" cap. BD
SANDER, Smith 42" Endless Bed, MD
SANDER, Curtis Brush Moulding, BB, MD
SANDER, Curtis Variety Edge & Vert. BB, DMD
DOVETAILER, Fay & Egan 15-sp. MD
MORTISER, Greenlee 212, 4-sp. BB, DMD
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4" Eaglefield Electric Moulder complete with 1½ HP Motors with spindles and separate feed motor. One set of square heads, motor controls, dust collectors, and also 7½ KW frequency changer for high speed. Complete $2500.00. Good condition.

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SANDER, Mattison No. 124 auto. stroke
SANDER, Indiana, belt, bb, 6' table, dmd
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1 New Type D-M 2 V5 motor driven Chain Saw Mortiser. 2 H.P. 220 volt 60 cycle 3 phase motor. ⅜"x1½" chain, bar and sprocket, $700.00

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Machines must be in good condition.

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If you will list below the wood-working machines, supplies or machine shop equipment in which you are interested and mail this page to us, we shall be glad to refer your needs to the manufacturers or others in position to serve you. Replies will come from them — not from us.

If you have any special shop problems let us have the details. Often we can make helpful suggestions.

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Westinghouse 5 HP

DOVETAILERS

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American 16" Wedge Bed BB
Crescent 12" DMD
12" Colloday L. Powers, H. B. Smith, Crescent, Sidney
Northfield 12" DMD
Yates-American 16" DMD

LATHES

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MORTISERS

Greenlee No. 228, Belt Drive
New Britain No. 2 and 7
Northfield chisel mortiser, motor driven
Wallace chisel mortiser, motor driven

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Mattison No. 224 9" all electric, hopper fd.
Mattison No. 262 6" Drop Bed, BB, all elec.
Sherrill 6" MD BB
Yates-American, 18" DMD C55, BB

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Monarch 20" CMD 5 HP with starter, New $675.00
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Whitney No. 32 36" BB CMD Knife Grinder
Whitney No. 32, 30" BB, Belt Drive
Whitney No. 29, 40" CMD, BB
Whitney No. 24, 30" Double, CMD
Yates-American B44 DMD sectional feed-flexible chipbreaker

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Onsrud Air
Onsrud 240
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Peerless 9", 14" and 20" horiz. & vert.
H. B. Smith 3 drum 4 motors No. 404 BB
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Tannewitz No. JDR DMD TA-revolving arbor 5 HP motors
Walker-Turner TA 5 HP motors

SAWS - CUT OFF

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Multiplex 5 HP DMD BB
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Woods No. 134-M 4" Electric
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DeWalt GE 5 H.P. motor
Multiplex No. B-60 radial arm, 7½ H.P. motor

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Mattison 42" No. 57-D motor drive ball bearing
Mattison 36" No. 53-C motor drive, ball bearing

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Woods 501M Direct Motor Drive, Ball Bearing Hardwood Flooring Machine
Woods 502M Electric Planer & Matcher with double profile and automatic feed table
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Yates A-1 Planer & Matcher

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Wysong & Miles No. 285 direct motor driven 6-spindle mortiser
Wysong & Miles No. 286 Hinge Seat Mortiser
Wysong & Miles 6-Spindle No. 288 Mortiser

MOULDERS

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Yates-American 30" No. 1 Jointer with Herseg Feeder

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Pearson Waterfall Sander
Oakley Model H Drawer Sander
Nash No. 80 and No. 25 Turning Sander

BAND SAWS

Yates-American 36" Type Y-36 motor drive, bb.
36" Yates-American Motor Driven Ball Bearing Band Saw
Yates-American Type V-54 Roller Brg. Band Resaw
Berlin 44" No. 283 Band Resaw

CUT-OFF SAWS

Beach No. 3 Roller table double cut-off saw
Bell No. 24-B Double End Sawing, Boring and Chucking Machine
Fay & Egan No. 501-A Direct Motor Driven Ball Bearing Swing Saw
Eaglesfield Direct Motor Driven Ball Bearing Swing Saw

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Yates-American U-9 Electric Router

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Whitney No. 234 Double Spindle Electric Shaper
Whitney No. 205 Double Spindle Automatic Shaper
Onsrud W-125 Double Spindle Automatic Shaper
Onsrud W-125 Single Spindle Automatic Shaper

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Root D210 Heavy Duty Hyd. Horiz. Single
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Fay & Egan Motorized 2-Spindle Horizontal

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Gallmeyer & Livingston Single Spindle
Minnesota No. 308E 16-Sp. Multiple

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Diehl No. 60 Cont. Feed Glue Jointer

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Mattison No. 55-C Ball Brg. Auto. Turning

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Enterprise Ball Brg. Pulley Mortiser, M.D.

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Yates No. 152, 24" Single Head, M.D.
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Hermance No. 300-G Self-Feed, B.B. M.D.
American No. 25 Chain Feed Rip, D.M.D.

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Whitney No. 163 Single, D.M.D.
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Bell No. 7 Auto. Gluer & Dow. Dr.

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Jenkins No. 343A Cont. Chain Feed
American & Superior 12" Rd. Hd.
Porter 30" w/Herzog Feeder, DMD

MORTISERS
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New Britain No. 2 Vert. Chain type

MOULDERS—FOUR SIDE
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Yates C-3A, 4" Ballbearing, MD

MOULDERS
Vonnegut 10" all electric, B.B.

PLANERS
American No. 666, 30" Dbl. Cabinet
Whitney 30-36-44" Sgl. Cabt., DMD
F.&E. 30" Sgl. Cabt., DMD, BB

ROUTERS
Ekstrom-Carl. 126 Hi-Speed, BB
Porter No. 500 Si-Speed, B.B.

SANDERS
Ekstrom-Carlson No. 112 Edge Belt
Yates No. 431 31" 3-drum end. bed
Curtis No. 64 Auto-stroke, MD
Mattison Belt Sander, DMD, BB
Pearson Edge Moulding, DMD, BB
Oakley E-1, Dbl. Belt, DMD, BB
Nash 210, 48" 6-spdl. Auto. Turn.
American 24"-30" Disc drum & spdl.
Solem SE7-4, 4-dr. end. bed, DMD

SAWS—VARIETY
Tannewitz JS250 Tilt. Arbor, DMD

SAWS—RIP
Mattison No. 207 Chain Fd., DMD
Greenlee No. 426 Spur Feed, MD

SAWS—CUT OFF
Mattison No. 244 Floor type, DMD
Bell No. 12-B Dbl. Mitre & c/o

SHAPERS
Onsrud W-125 Auto. fully equipped
Oliver Sgl. Spdl. Hi-Speed, BB
Buss Dbl. Spdl. Hi-Speed, BB
Whitney 39-A Dbl. Spdl. DMD, BB

SPREADERS—GLUE
Black 12" Steam or elec. ht., DMD
Black 62" Dbl. roll resin, DMD
Francis 45" double Roll, MD

TENONERS
American & Colladay Sgl. End, MD
McKnight 71-C, Chain Back Type

VENEER MACHINERY
Bertheison 36"x72" Hydr. Hot Press
Black 36"x72" Electric Press, DMD
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Dennis Taping Machines, MD

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Greenlee No. 360, 4-spindle, B.B., D.M.D.

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Morgan 6 & 10-track C.B., Nailer, M.D.
Morgan 12-track, 30" O.B. Nailer, M.D.
Morgan 48-track, 48" C.B. Nailer, M.D.

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Billstrom 39-section, 6'6" capacity
Billstrom 25 sections—16' 6" Capacity

JOINTERS
Towsley 16", B.B., D.M.D.
Yates-American No. 213 Glue Jointer, B.B.

LATHES
Mattison No. 57D, Double End Drive

MORTISERS
Sidney No. 702 Hollow Chisel, B.B. D.M.D.
New Britain No. 2 Chain, W & M No. 285 6 sp. horiz., hollow chisel B.B., D.M.D.

MOULDERS
Yates-American C-88, 6"x4", all electric
Yates-American C-88, 8"x4", all electric

PLANERS
Crescent P24 - 24" single, B.B., D.M.D.
Yates No. 156—30" Single cabinet, B.B., D.M.D.
Whitney No 32-30" Single Cabinet, B.B. D.M.D.
Whitney 29-36" Single Cabinet B.B. D.M.D.
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Porter No 612, B.B., M.D.
Ekstrom-Carlson No. 327, B.B., M.D.

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Mattison No. 124-6" Auto. Stroke, M.D.

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Specifications for more than 1,400 wood products, purchased by the federal government for its military and other agencies, are listed in a 32-page directory published by Timber Engineering Company, 1319 Eighteenth St., N.W., Washington, D.C., research affiliate of National Lumber Manufacturers Association, in cooperation with the U.S. Army Corps of Engineers.

The listed specifications have been reviewed by TECO laboratory technologists to bring them up to date with the latest research developments in wood product manufacture. Many of the old specifications, found to require lumber items no longer available in sufficient volume, or obtainable only at premium prices, resulted in procurement problems and higher costs.

Subsequent revisions made by the government, based on TECO recommendations, now admit a wider variety of wood species and grades, permit the use of modern gluing and laminating, and otherwise offer a wider scope of materials and methods with which manufacturers can fill orders, more quickly and economically, for the wood industries' largest customer.

APPALACHIAN HARDWOODS

"Appalachian Hardwoods" is the title of a 20-page brochure, printed in four colors and profusely illustrated, just issued by the Appalachian Hardwood Manufacturers, Inc., 414 Walnut St., Cincinnati 2, Ohio. Both the text and photography were supplied by H. D. Bennett, manager of the AHMI trade extension department, who developed the brochure around the theme "The beauty of wood in the home is outstanding." In an intriguing manner, Mr. Bennett developed the chosen theme to show by means of text and illustrations that the interesting grain patterns and distinctive colors of Appalachian hardwoods, plus the natural markings of the various species, add warmth, beauty, dignity and distinction to the home.

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Clamp, end, Handy No. 421, 90"x48", air
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Lock corner cutter, Superior, single-end, hand-feed
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Ripsaw, self-fd., ballb., F&E No. 584, 7½ h.p.
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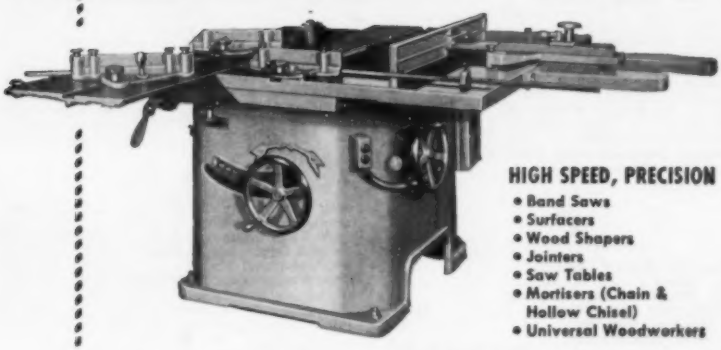
No. 4 VARIETY SAW
Tilting Arbor Type

Arranged with both rolling table and extended table



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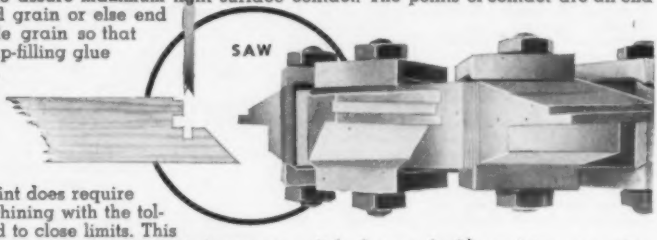
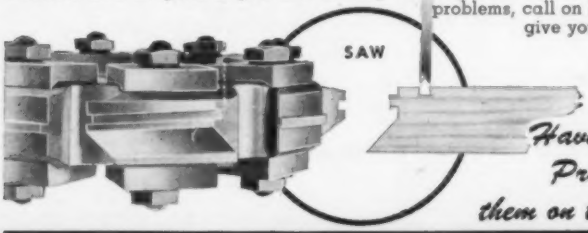
MAKE Mitre Lock JOINTS FOR CASE GOODS PRODUCTION WITH BADGER CUTTERHEADS

The mitre-lock joint is used in making all kinds of case goods: cedar chests, chests of drawers, boxes, and other products requiring tight, strong corner joints. The true mitre-lock joint illustrated above is the strongest type and it provides more positive locking action compared to other variations. Other types of corner lock-joints are available upon request to suit special needs due to veneering, thickness of stock, ease of gluing, etc. The standard joint shown is particularly suited to stock over ¾" thick. Pressures exerted on the joint to pull it apart are resisted fairly well but the joint is somewhat weak if made to withstand pressures that compress the included angle. The success of this mitre-lock joint is dependent on accurate machining to assure maximum tight surface contact. The points of contact are all end grain to end grain or else end grain to side grain so that a strong, gap-filling glue is desirable.



The mitre joint does require precise machining with the tolerances held to close limits. This accurate machining of the joint is best accomplished on a double end tenoner using either saws or Badger Groover Discs on the tenon arbors and Badger Clamp Type Heads with milled-to-pattern bits on the cope spindles. The set-up for one-half of the joint is shown above; the other half below.

Many other types of lock-joint designs have been worked out for small chests, silver boxes, display cases, etc. These are used for thinner stock and are run on single end tenoners and shapers. If you are making "case goods" and have joint production problems, call on Badger Engineers to give you the benefit of their experience.



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Engineers to the Woodworking Industry

The Anderson Coach, produced by
Anderson Coach Company, East Tawas, Mich.

What! No Nails?

That's right—nails for structural use have been outlawed in the Anderson Coach! Wood welding with Cyanamid's URAC® Resin 185 makes joints actually stronger than the wood itself . . . incomparably stronger than nailed joints.

Because of the length of most trailers today—sometimes 30 feet from hitch connection to wheels—the stresses set up by the bending are tremendous. A nailed structure is almost incapable of bearing such loads without serious distortion and deflection. But bonded with URAC 185, structural joints won't pull apart . . . and won't rattle or vibrate.

This moisture-resistant urea-formaldehyde adhesive sets at room temperature and low pressure, or can be cured with high-frequency heating. Its use by Anderson Coach is typical of the advanced construction methods that make this mobile home one of the safest and strongest on the market.

If you, too, want strong, sure bonds, try URAC 185 for assembly gluing or the bonding of veneers, hardboards, plastic laminates, etc. A trial run will convince you.

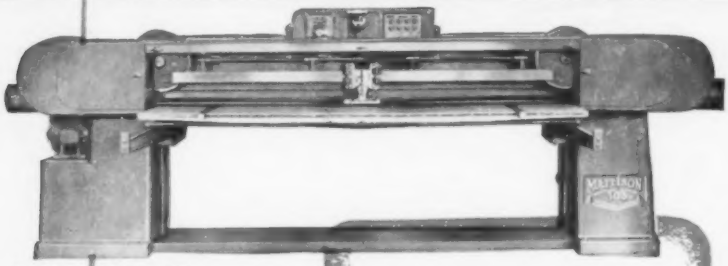
URAC 185 being applied to 2x6 beams and cross pieces by tube with roller.

AMERICAN Cyanamid COMPANY
PLASTICS AND RESINS DIVISION
32A Rockefeller Plaza, New York 20, New York

In Canada: North American Cyanamid Limited
Toronto & Montreal

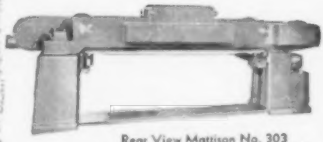
MATTISON'S NEW

No. 303 Automatic STROKE SANDER



Front View Mattison No. 303
Automatic Stroke Sander — Single Belt

Mattison No. 303
Automatic Stroke Sander — Double Belt



Rear View Mattison No. 303
Automatic Stroke Sander Single Belt

● The Mattison No. 303 Automatic Stroke Sander is the last word in modern engineering. From the standpoint of design — construction — smoothness of operation and appearance, it is in a class by itself. Results that can be expected are faster output, better quality of work, and trouble free operation. These important features are all to your advantage. Hydraulic system for operation of shoe is simple yet positive in action, providing smooth operation of sanding shoe the entire length of stroke. Belt speeds to meet your needs. All controls are within easy reach of operator. The sand belt is completely enclosed at top and both ends for dust control and safety. Belts are easily and quickly changed. Aluminum sanding shoe is mounted on ball bearings for easy operation and control. Massive base and column construction provide solid foundation. The Mattison No .303 Automatic Stroke Sander is recommended as the most efficient method for finish sanding large, flat surfaces such as tops, panels, doors, etc. It provides perfect work on a real production basis. Double-belt model with coarse belt for removing tape and glue, and fine belt for finish sanding, speeds up production by reducing handling time and, in many cases, eliminates drum sander operation.

Send for complete information on the 303, the latest in stroke sanders.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS